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The Status of Women Agricultural Economists in Academia

by

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Abstract

Results of three surveys are reported on the status of women agricultural economists in academia. Data from the 1990 survey is used to test hypotheses about the distribution of women graduate students and faculty. Data from the 1991 departmental survey of graduate students is used to examine the composition of foreign versus domestic students by gender and program. Nearly 60% of all Ph.D. students are from foreign countries. A 1991 survey of women graduate students is used to examine their needs, preferences and interests. Results from the three surveys are similar to trends for women in economics and academia in general. A pyramid structure exists for women in terms of their percentages at the student and faculty levels. Preference for higher ranking schools by female graduate students is paralleled by women faculty. Over half of all women in a PhD program attended the top 10 ranked universities (as opposed to 35% for males). Results indicate financial aid, good advising and mentoring attract female graduate students. However, despite attending high ranking schools and having research interests that closely match those of academia, 74.5% of female students say that they prefer non-academic positions as their first choice. This may pose problems for academic recruitment of the best students, as well as, having an impact on the future quality of academic research. Demographics point to a need to replenish faculty at the same time that there is a greater demand for diversity among faculty. Departments that utilize strategies that attract women will have a larger pool from which to select candidates, giving them a competitive edge in maintaining and improving their academic excellence.

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A university chancellor had this comment concerning hiring women:

> "Departments that don't show any energy in these areas are not going to find themselves...as first-rate departments. Any university that leaves out half the talent isn't going to be competitive." (McDade and Smith)

The status of women in agricultural economics has been surveyed by the American Agricultural Economics Association (AAEA) Employment Services Committee, 1990; Lee and Offutt, 1986; and Lundeen and Clauson, 1981. In 1990 and 1991, the Graduate Student Subcommittee of the Committee on Women in Agricultural Economics (CWAE) surveyed agricultural economics departments in the U.S. and Canada. The purpose of the CWAE surveys was to determine the composition of graduate students and faculty in agricultural economics. Additional effort was made to identify the interests and needs of female graduate students and thereby to infer whether female mentors are important in attracting women graduate students; whether woman economists self-select out of academia; and whether they are flexible or mobile in their job search. The results are of interest to recruiters and those interested in the professional progress of woman economists who are concerned about the profession's future.

Enrollments of undergraduates in agricultural economics departments have

been declining at many universities. In order to attract more students, departments will need to expand the traditional pool to include female and minority students. Since over half of all undergraduates were female (Gender Equity Task Force), yet females were only one-fourth of the recipients of bachelors degrees in agricultural economics in 1990 (AAEA Employment Services Committee), there appears to be a under-developed market for women agricultural economists. Those departments which are better informed and able to satisfy the needs of their potential students, half of them women, would have an edge over their competitors in attracting high quality students.

Examination of many academic institutions indicates that a large number of retirements will coincide with low numbers of Ph.D. students to replace them (Schotzko). On the other hand, examination of the composition of graduate students in all programs shows that Ph.D. students are increasingly minority and female. Recruitment of female and minority for academic positions may be inevitable as well as pertinent in maintaining and enhancing the quality and standard of our profession. The general literature on work force diversity suggests that endeavors carried out by a work force that does not represent the diversity of its clientele group can easily become outmoded, undervalued, or obsolete, since a homogeneous group will have greater difficulty than a group more representative of clientele in identifying what clients want in the way of goods and services. Departments that accommodate the changes by diversifying their faculty may find it easier to recruit additional women and minority students and faculty. (Gender Equity Task Force).

Progress and Prospects of Women in Agricultural Economics

Three observations were made regarding women in academia: (1) there are fewer women than men; (2) the percentage of woman decreases as women progress from students to professors, i.e., a pyramid structure exists; and (3) women faculty are not advancing to senior levels as fast as some would expect. Although scarcity and a pyramid structure may reflect demographic changes, as well as, gender biases, problems of retention and promotion of female professors do cause concern.

First, let us look at the professional involvement of female agricultural economists and compare it to other disciplines. A joint study by Lundeen and Clauson and by Redman found that only 5% of the AAEA membership in 1981 was female. This compares with 10% in the American Economics Association (AEA) in 1980 (Bailey).

The pyramid structure is evident in economics. In 1987-88, 31.4% of the bachelors recipients in economics were female, 29.1% of the masters recipients were female, 19.4% of the Ph.D. recipients were female, and 8.7% of the faculty was female (Gordon). Since the base includes men and women, it goes without saying that a pyramid structure for women implies an inverted pyramid structure for men.

In terms of faculty positions, female assistant professors were hired about at the same rate female Ph.D. students were produced; however, they changed jobs at two and a half times the rate of men in 1985 (Lee and Offutt). Between 1974 and 1989, female assistant professors increased from 8% to 20%, while female associate professors went from 3 to 9% and female full professors from 2 to 3%. A simulation

study by the Committee on the Status of Women in the Economics Profession (CSWEP) indicated women were in deed being hired at roughly the same proportion as woman completing Ph.D.s, but promotions to associate and full professor fell below predictions provided by the model ("CSWEP Annual Report, 1990").

Chamberlain refers to the phenomenon of hiring women but not tenuring them as the "revolving door." She found that between 1975 and 1986, women are two-thirds to three-quarters as likely as men to receive tenure in all fields. Women also tended to concentrate in limited fields and at lower ranks (Webster).

The "glass ceiling" hypothesis is one explanation of why there is a revolving door. It asserts that women are permitted to rise to a certain level and are prevented from going any higher. A continuing debate in the corporate world is that there are very few women executives at high level management positions, regardless of their performance and qualifications.

Another explanation of the revolving door is that women do not compete well with their male counterparts at the time of promotion and tenure. Boehlje and Levins examined tenure for both men and women in agricultural economics during 1984-1988. They found that the tenure rate, which is as high as 85%, depends upon teaching load, committee assignments, mentoring and frequency of evaluation. Rejection was usually higher for those with large teaching appointments and lower for those with large extension appointments. To the extent that women may teach more, serve on more committees and have fewer extension assignments, this may put them at a disadvantage, leading to a lower tenure rate. Webster has shown that heavier

advising and teaching loads also lengthen the time for women academics to reach tenure.

Recommendations to improve retention include: providing written tenure guidelines; assisting women faculty with funds, space and equipment to develop research programs; equitably distributing committee and instructional assignments; and developing a mentor program for untenured faculty (Gender Equity Task Force). Unfortunately, Reed, et al. found women faculty in general felt lack of support from departmental colleagues and perceive evaluations, teaching assignments, access to information on grants and support, or committee assignments as inequitable. Many senior males may be less comfortable mentoring females which results in less interaction between them professionally and personally. Women may perceive this as an unsupportive environment.

Past research indicates quality is not the issue, since women are on average better prepared and preform better academically (Chamberlain; Webster; Redman). Women have also been found to be more mobile and less restrained by family matters than men. Heavy teaching loads and committee assignments and isolation appear to contribute to poor retention and promotion of women in academia.

1990 and 1991 CWAE Surveys

These surveys update the analysis of the pyramid structure of the agricultural economics profession. The first survey conducted in the summer of 1990 by CWAE was sent to 130 agricultural economics institutions including most agricultural

Ph.D. and masters programs were 22.7% and 31.3 %, respectively. Therefore, there was a slight increase in women Ph.D. students. This result is encouraging compared with AAEA findings for previous years (Table 1). The AAEA Employment Services Survey showed that, in 1987-88, women comprised 19% of the recipients of the bachelors degree, 19% of the masters degree, and 15% of the Ph.D. degree in agricultural economics. The corresponding figures were 23%, 18%, and 18% for 1988-89, and 25%, 22%, and 15% for 1989-90.

Using the Gregory and Adams index of the 25 top departments (see Table 2), the 1990 CWAE survey indicated that 49.9% of all women Ph.D. students attended the top 10 schools and 82.4% of all women Ph.D. students attended the top 25 schools (Figure 1). Given the subjectiveness involved in the precise rankings of departments, we use the rankings to focus on the top 10 and top 25 departments. Thus, our analysis does not depend upon the relevant rank within these groups.

Regional comparisons indicated that the Midwest had the largest proportion of total graduate students in the U.S. (31.1%), followed by the West, South and Northeast. The Midwest also had the largest share of women in graduate school (28.5%), Ph.D. (33.9%), and masters (26%) programs (Table 3). In the West, California alone had 21% of all female Ph.D. students.

As a percentage of all graduate students, the Northeast had the highest ratio of females to males in their departments. Women comprised 36.8% of the graduate students within the Northeast. The West had the next highest proportion of female graduate students, 30.6% (Table 3). Data from the AAEA Employment Services

survey confirmed that the Northeast and the West have had the highest percentage of women enrolled in both graduate and undergraduate degrees. This distribution of women was also consistent with Lee's (1982) findings that women tended to be employed in these two regions.

In terms of women faculty, the 1990 CWAE survey revealed that there were 12 full, 23 associate, and 48 assistant professors in the U.S. and Canada. The average number of women faculty per agricultural economics department was 1.3; 32.3% did not have any women faculty. This compares with Bailey's 1980 study in which only a quarter of economics departments had no women faculty. Of the responding departments, 63% of all tenured women and 58% of all full professors were employed by the top 25 schools. Table 2 shows the number of women faculty at the top 25 agricultural economic departments. The University of Minnesota had the highest number of women faculty in 1990, which was five. By region and faculty rank, the Midwest employed the most women faculty as full and associate professors, while the West and Northeast were tied at the assistant professor level (Figure 2). The number of women faculty in a department is thought to be a key element for creating a supportive environment for themselves, as well as, women students (Gender Equity Task Force). In addition, the more women in a department, the less likely they were to be perceived as different, resulting in fewer reported problems.

The 1991 survey provides added information on domestic versus foreign students (see Table 4). Foreign students make up nearly half of all graduate students in agricultural economics. Within Ph.D. programs, they make up nearly

60%, while in masters programs, the percentage is closer to 40%. Female Ph.D. students are nearly evenly split between domestic and foreign students, while foreign males exceed domestic males by about 50% in Ph.D. programs. The reverse is true in masters programs, that is, domestic males exceed foreign males by about 50% and domestic females outnumber foreign women by about 60%. One of the implications of this information is that applicant pools for academic positions may be increasingly made up of foreign students, as well as women, in sharp contrast to the current composition of agricultural economics departments.

Hypothesis Tests on CWAE Survey Results

Following Steel and Torrie, the statistic used to test for equal means with unequal variances is:

$$T = \frac{\bar{Y}_1 - \bar{Y}_2}{s_{\bar{Y}_1 - \bar{Y}_2}}$$

where T is the calculated Student's t-statistic, $\bar{Y}_1$ and $\bar{Y}_2$ are the average of two populations and $s_{\bar{Y}_1 - \bar{Y}_2}$ is the standard deviation of the difference between the estimated means. s_{y1-y2} is calculated:

$$s_{\bar{Y}_1 - \bar{Y}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

where n_1 and n_2 are the number of observations in each sample and s_1^2 and s_2^2 are

the variances of each group. The effective degrees of freedom (e.d.f.) used to determine the threshold t value is:

$$e.d.f. = \frac{(s_1^2/n_1 + s_2^2/n_2)^2}{[(s_1^2/n_1)^2/(n_1-1)] + [(s_2^2/n_2)^2/(n_2-1)]}$$

A statistically significant difference at 5% existed between the percentage of women enrolled in masters programs (28%) and PhD programs (22%) (T = 2.3, e.d.f = 94), confirming the pyramid structure of agricultural economics. In addition, statistical differences at the 5% level were found between the percentage of women attending large versus small agricultural economics departments. Using the total number of graduate students as the measure, women comprised 32% of the graduate students in small departments (less than 50 graduate students) versus 25.6% in large department (more than 50 graduate students) (T = 2.6, e.d.f. = 57).

With respect to regional differences, the percentage of women Ph.D. students was not significantly different at the 5% level between (1) the Midwest and the South, or (2) the West and the Northeast (Table 5). The Northeast and the West had a significantly higher percentage of women than the Midwest and the South, however.

The percentage of women PhD students at ranked and unranked schools was not significantly different at the 5% level (T = 0.1, e.d.f = 28). Nor were the number of women faculty at ranked and unranked schools significantly different (T = 0.04, e.d.f = 41). However, the percentage of women Ph.D. students who were at the top 10 ranked universities was significantly higher at the 1% level than at the rest of the

universities (T = 3.4, e.d.f. = 20).

A positive correlation was found between the prevalence of women graduate students and women faculty. That is, departments with a below average percentage (23%) of women graduate students had significantly less female faculty than those departments which were above average (T=2.00, e.d.f.=60). This difference was significant at the 5% level of tenured and full professor (T=2.00, e.d.f.=60; T=2.02, e.d.f.=40). Departments with below average percentage of women graduate students had 0.7 women faculty, compared with 1.6 for the departments with above average percentage of women graduate students. The difference is even more pronounced at the tenured and full professor level; 0.2 tenured women professors for the former category and 0.8 for the latter; 0 women full professors for the former and 0.3 for the latter. This difference may be due to the mentor effect mentioned above or because departments that are receptive to women faculty are also receptive to women students.

Identifying Needs and Preferences of Women in Academia

The questionnaire of women graduate students sought to identify characteristics of women graduate students, the resources that would facilitate their studies and to assess whether they were interested in academic careers. These data are used to determine whether women self-select out of academia.

Of the 199 respondents to the survey of women graduate students, 46% of the respondents had a bachelor's degree in economics, resource economics or

agricultural economics. Sixty-one percent of the respondents were in a masters program and 39% in a Ph.D. program. Of the masters students, 48% did not wish to pursue a Ph.D., 42% did, and 10% were undecided. Students perceived that it took 25.6 months to complete a masters degree and 53.1 months to complete a Ph.D.

Among respondents, 52% were US citizens, 8% were Canadian, 7% were Chinese and the rest were widely distributed from around the world. The majority, 64%, were white, 21% asian, 7% african american, 6% hispanic, 1% native american and 1% other. The average age of respondents was 29.1 years old. 54% of respondents were single, 41% married and 4% divorced. Further, 21.6% of the respondents had children. The average number of children was 1.7, with the majority of children aged 6 or younger.

The largest proportion were pursuing a graduate degree with emphasis on resource economics (19%), followed by marketing/agribusiness, general agricultural economics, international trade or economics, production/farm management, development, policy, regional economics, and other (Table 6). The primary reason for being in graduate school was self-fulfillment. Higher pay, the degree being required for a promotion, and higher status were viewed as less important.

Eighty-six percent of the respondents were attending graduate school full time, the remainder part-time. Sixty-three percent were supported with research or teaching assistantships, 17% with fellowships, and 17% depended on their own resources to attend graduate school. The assistance most needed to ensure successful completion of a graduate degree in agricultural economics for women

graduate students was financial support; followed by mentor support from an advisor, faculty or senior students; followed by a supportive environment. Rich explains the need for a mentor by women students as a product of an education system that focuses on the achievements of males.

When asked who can best provide needed assistance, the female students responded that the most important person was themselves. This self-reliance is consistent with the research by Chamberlain and Weber who found that women attribute professional success to personal traits, such as, hard work, self-motivation, interest and skills. Technical assistance, facilities, child care and travel assistance were considered least important. By comparison, men viewed external factors, such as, institutional resources, time, student assistance, and funding as more important to their personal success.

In terms of employment, the survey revealed that students prefer international organizations (29.9%), followed by educational institutions (25.5%), private industry (24.5%), government (14.7%) and non-profit organizations (5.4%). The preferred work activity was research, extension or teaching, followed by consulting, management and administration. Comparing this to available jobs, 38% of Ph.D. recipients took academic jobs in 1989-90, and 24% took government jobs (AAEA Employment Services). Therefore, women's work interests mesh with those of academia but 74.5% prefer to work for other institutions.

Respondents felt the most important factor to consider in employment decisions is one's personal life (28.8%). Research funding was next (17.6%), geographic

location ranked third (17.1%), spouse's or partner's employment ranked fourth (16.1%), and pay fifth (10.7%). Spousal employment may become a bigger issue later in one's career. A 1987 survey of CWAE members indicated that a partner's mobility was a problem for 60% of the respondents (Jagger and Harwood). Child care ranked sixth (5.4%) and prestige was ranked last (0.5%).

Implications and Conclusions

By 1989, 9% of the agricultural economics faculty were 61 years old or older, with the highest proportion of faculty over 60 in the Midwest and Northeast regions. Over a third of the faculty was over 50 years old in 1989, indicating high turnover during the decade of the 1990s and into the 21st century. Given that the average size of faculty in agricultural economics departments is 22, and the actual demographics from the AAEA Employment Services Committee, each department will need to replace an average of 7 members in the next 15 years (AAEA Employment Services). This assumes departments will not be downsized due to budgetary problems. In a previous study, Schotzko identified the greatest need for positions to be in the areas of production/farm management, then marketing, then natural and community resources.

As indicated, the majority of the current faculty is male. However, the available pool of PhD candidates for academic positions is increasingly made up of females, as well as foreign students. Therefore, to reiterate McDade's and Smith's observation, departments that do not show any energy in recognizing or resolving

these issues will not remain competitive. Quality and qualifications do not appear to be an issue, since women were found to be well represented in all fields except farm management and production economics (Lee and Offutt) and, on average, are better prepared academically, given that they are more likely to be at the top ten ranked universities. In addition, Chamberlain found that women publish more after receiving tenure than men. Therefore, recruiting women not only expands the pool of qualified candidates, it gives departments more productive people. Retention of women in academia depends upon equitable teaching loads, committee responsibilities and fostering a supportive work environment. A profession that encourages and rewards its most talented members raises the quality of the profession as a whole.

One obstacle to recruitment of women in academia is that women do appear to self-select out of academia, 74.5% list non-academic organizations as their first employment choice. The problem this presents for academic recruitment is that departments may not be able to select from among the best talent. While some of the factors are beyond the control of an institution, such as geographic location, universities in the West and Northeast should be aware of their comparative advantage in recruiting women. Greater emphasis on personal life, research funding, and partner's employment opportunities are within the control of departments wishing to appeal to women candidates. Our research shows that departments emphasizing pay and prestige are using a losing strategy in trying to appeal to women, since these are less important in their employment decisions.

Our work has shown that personal fulfillment is the primary objective for

women seeking employment in agricultural economics. The presence of other women in the department and good mentoring are two keys to creating a supportive environment for women. In addition, financial support is important to students, research funding is important after they graduate, and geographic location plays a major role in recruiting women at both levels. Focusing on these aspects to recruit women as students and faculty will create a larger, higher quality pool of applicants for agricultural economics departments to select from.

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Table 1

Percentage of Women in Agricultural Economics Degree Programs			
	DEGREE		
Year	Bachelor	Masters	Ph.D.
1987-88[a]	19%	19%	15%
1988-89[a]	23%	18%	18%
1989-90[a]	25%	22%	15%
1990[b]	--	28.1%	22.2%

[a] AAEA Employment Services Survey of completed degrees.

[b] 1990 CWAE Survey of students enrolled by degree.

Table 2. Ranking of 25 Departments of Agricultural Economics by Number of Citations, 1966-1988, and Number of Women Professors, 1990

Rank[a]	Department	Women Professors, 1990[b]
1.	U.C.-Berkeley	1
2.	Stanford FRI	2
3.	Minnesota	5
4.	Wisconsin	1
5.	Ohio State	2
6.	U.C.-Davis	3
7.	Cornell	3
8.	Maryland	1
9.	N.C. State	0
10.	Illinois	3
11.	Michigan State	3
12.	Texas A&M	0
13.	Iowa State	3
14.	Florida	2
15.	Oregon State	2
16.	Purdue	3
17.	Washington State	1
18.	Kansas State	2
19.	V.P.I.	4
20.	Arizona	1
21.	Missouri	0
22.	Georgia	1
23.	Oklahoma State	3
24.	Penn. State	2
25.	Kentucky	1

[a] Gregory, G. L. and D. W. Adams. Ranking of 25 Agricultural Economics Departments and Their Faculty by Citation Counts, 1966-1988. Department of Agricultural Economics and Rural Sociology Paper No. 1685. The Ohio State University, February 1990.

[b] Assistant, Associate or Full Professors.

Table 3. U.S. Regional Distribution of Graduate Students in Agricultural Economics, 1990. (percentage)[a]

	Total Students	Female Students	Female Ph.D.s	Female M.S.s	Proportion Female
Midwest	31.1	28.5	33.9	26.0	23.7
Northeast	10.9	15.5	15.5	15.5	36.8
South	28.6	23	20.2	24.5	20.2
West	22.5	26.5	29.2	25.4	30.6

[a] Totals do not add up to 100% because Canada and Puerto Rico were included in the survey.

Table 4. 1991 CWAE Survey of Graduate Students: 53 Agricultural Economics Departments

	Total	Percent Grad Students	Percent Ph.D. Students	Percent Masters Students
Domestic Women Ph.D.	120	5%	10.9%	
Foreign Women Ph.D.	130	5.4%	11.8%	
Women Ph.D.	250	10.4%	22.7%	
Domestic Men Ph.D.	334	14%	30.3%	
Foreign Men Ph.D.	517	21.7%	47%	
Men Ph.D.	851	35.6%	77.3%	
Domestic Ph.D.	454	19%	41.2%	
Foreign Ph.D.	647	27.1%	58.8%	
Total Ph.D.	1101	46.1%	100%	
Domestic Women Masters	248	10.4%		19.3%
Foreign Women Masters	155	6.5%		12%
Women Masters	403	16.9%		31.3%
Domestic Men Masters	519	21.7%		40.3%
Foreign Men Masters	365	15.3%		28.4%
Men Masters	884	37%		68.7%
Domestic Masters	767	32.1%		59.6%
Foreign Masters	520	21.8%		40.4%
Total Masters	1287	53.9%		100%
Domestic Women Graduate Students	368	15.4%		
Foreign Women Graduate Students	285	11.9%		
Women Graduate Students	653	27.3%		
Domestic Men Graduate Students	853	35.7%		
Foreign Men Graduate Students	882	37.0%		
Men Graduate Students	1735	72.7%		
Domestic Graduate Students	1221	51%		
Foreign Graduate Students	1167	48.9%		
Total Graduate Students	2388	100.0%		

Table 5. 1990 Regional Distribution of Female Graduate Students
Hypothesis Test Results

	T-Value	e.d.f.	Threshold $t_{.05}$
Midwest vs. South	2.0	12	2.2
Midwest vs. West	5.7	22	2.1
Midwest vs. Northeast	8.0	21	2.1
South vs. West	6.9	17	2.1
South vs. Northeast	12.7	11	2.2
West vs. Northeast	1.3	22	2.1

Table 6

1991 Female Graduate Student Survey Responses to Primary Area of Interest.		
	Number	Percent
Natural Resource/Environment/Marine/Forest/ Land Economics or Water Quality	37	19%
Marketing/Agribusiness/Finance/Consumption/ Advertising/Pricing	35	17.5%
Agricultural Economics/Economics/Microeconomics	30	15%
International Trade/Finance/Marketing/Economics	22	11%
Production/Farm Management	15	7.5%
Development	14	7%
Policy/Applied Economics/Law	14	7%
Regional/Rural Development	11	5.5%
No Answer	11	5.5%
Other	10	5%
Total	199	100%

Figure 1.

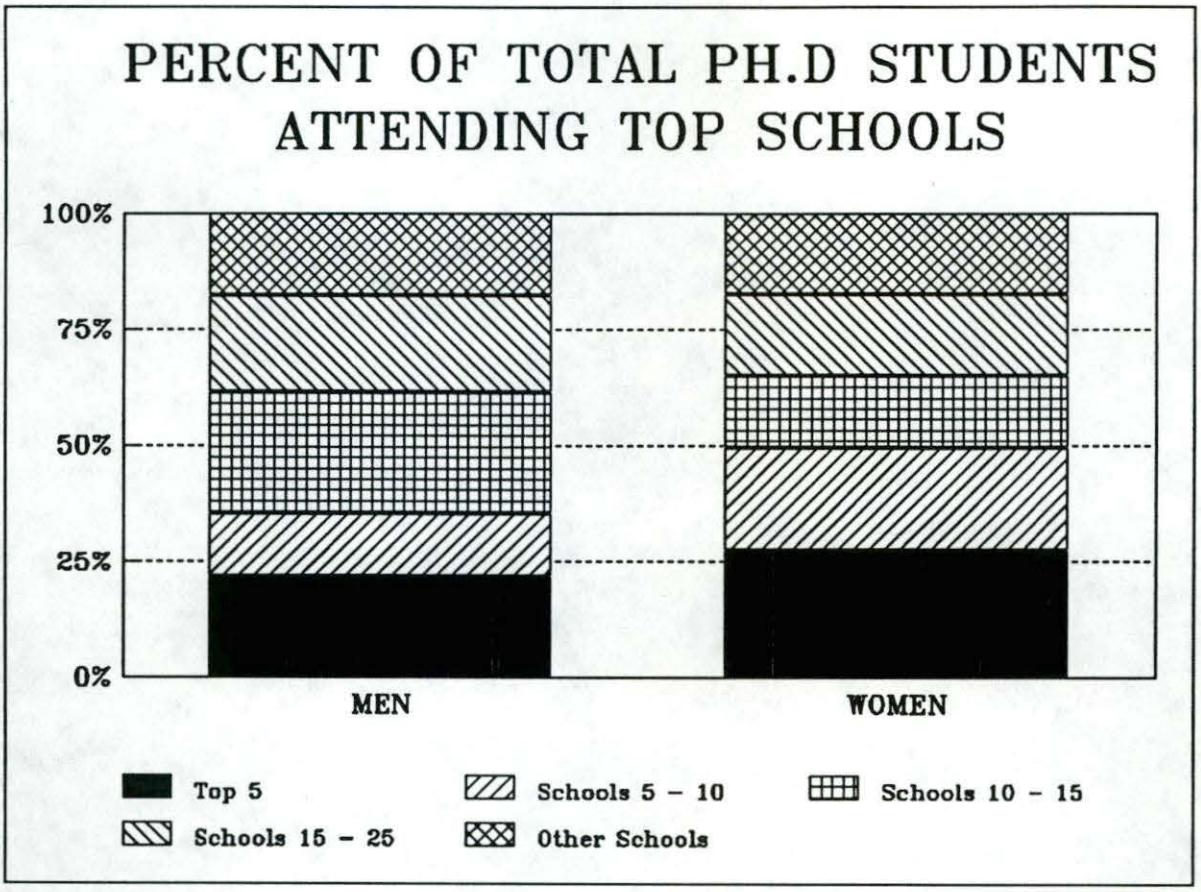
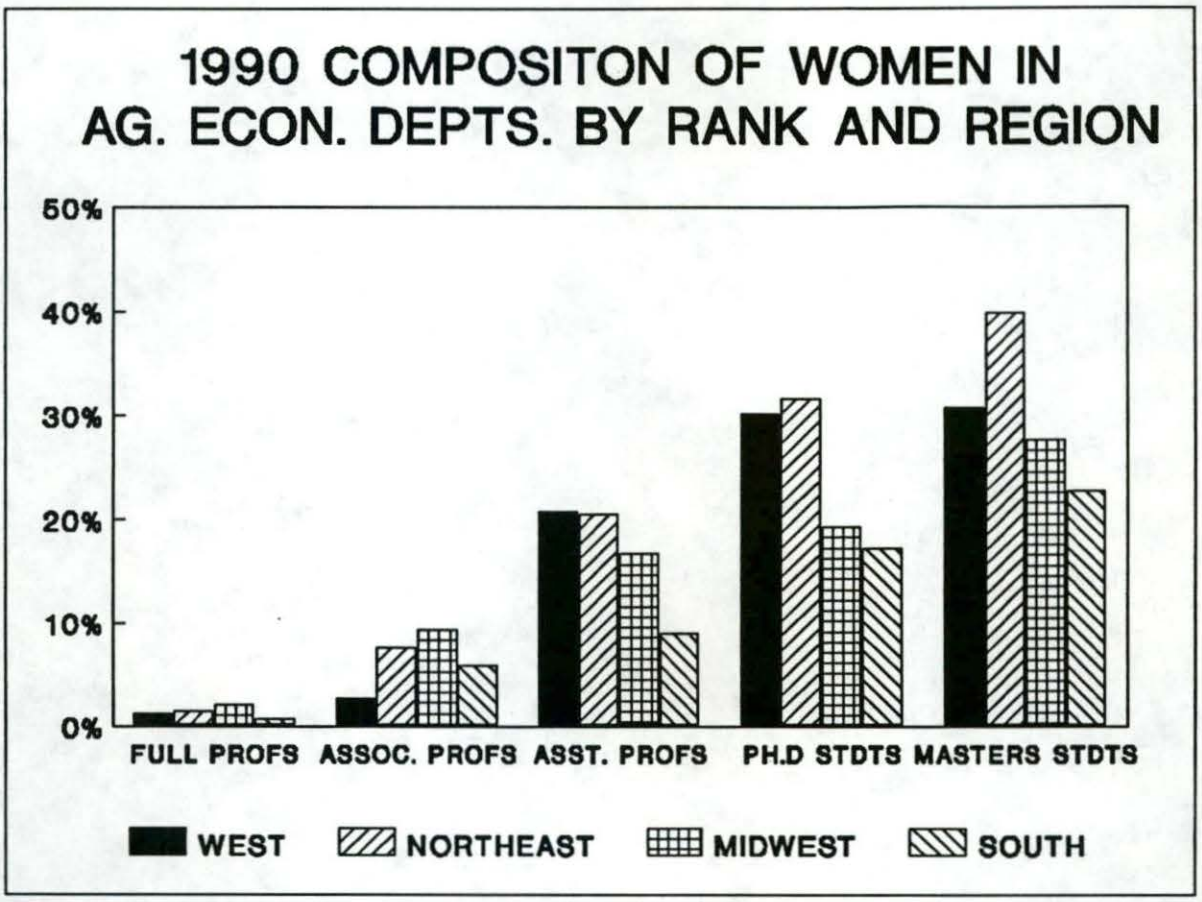

PERCENT OF TOTAL PH.D STUDENTS ATTENDING TOP SCHOOLS
100%
75%
50%
25%
0%
MEN
WOMEN
Top 5
Schools 5 - 10
Schools 10 - 15
Schools 15 - 25
Other Schools

Figure 2


1990 COMPOSITON OF WOMEN IN
AG. ECON. DEPTS. BY RANK AND REGION
50%
40%
30%
20%
10%
0%
FULL PROFS
ASSOC. PROFS
ASST. PROFS
PH.D STDTS
MASTERS STDTS
WEST
NORTHEAST
MIDWEST
SOUTH