The Last of the American Ag Economists

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by

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Abstract

It has become more and more difficult to recruit prospective American Ph.D. students in Agricultural and Applied Economics. The purpose of this study was to determine the extent of the problem, to ascertain why with respect to location and other important factors, and hopefully deduce recruiting solutions. Results indicate that the paramount factors in a profile of those willing to pay the price in terms of sacrifice and effort to obtain a Ph.D. encompass willingness to accept a relatively low starting salary with a Ph.D., likely to be a Foreign National, prone to be in a Midwestern university, and willing to relocate globally. Generally, the Ph.D. starting salary would have to increase dramatically to change the minds of graduate students not intending to pursue a Ph.D. including most American graduate students. A change in public policy appears to be the only real solution.

Introduction

Over the years I have observed that it has become more and more difficult to recruit prospective American Ph.D. students in Agricultural and Applied Economics. When I first started in this profession many years ago, Foreign Nationals were a small minority with respect to the total number of graduate students in agricultural economics. Today, the situation is reversed. I now observe that American Ph.D. students are scarce. My observations appear to be true nationwide. Having recently served on a couple of search committees for faculty positions, I was amazed at how few American Ph.D. students were in the applicant pools – two or three out of some 30 to 35 applicants.

With major recruiting responsibilities, I decided to do a survey in an effort to reach as many graduate students as possible in typical land-grant agricultural economics departments in the United States. The purpose of the survey was to determine the extent of the problem of recruiting prospective American Ph.D. students, to ascertain why with respect to location and other important factors, and hopefully deduce recruiting solutions.

Sample Data

A questionnaire was developed to solicit goals and relevant characteristics of graduate students. Questions were about whether the student was pursuing or planning to pursue a Ph.D., expected salary if yes, required salary to pursue a Ph.D. if no, nationality, ethnicity, citizenship, willingness to relocate in the United States, willingness to relocate globally, university, home state, professional work experience, age, gender, marital status, and with/without children. The questionnaire was administered via email and interview from the fall of 2007 to the fall of 2008. Incomplete questionnaires were eliminated for analytical consistency.

There were 144 total observations with 122 of the observations having an identified university. Preliminary analysis resulted in the development of two final hypothesized models: (1) The decision to pursue a Ph.D. is related to salary, age, being an American, region of university, willingness to relocate in the United States, willingness to relocate globally, ethnicity, and gender. (2) The decision to pursue a Ph.D. is related to the same variables as above except for the regional variables which in this case encompass home state regions instead of university regions.

Econometric Analysis

Two Probit models were used to estimate the likelihood that a student will pursue a Ph.D. based on the hypothesized factors (Wooldridge 2000). A description and simple statistics for the variables included in the Probit models are presented in table 1. The specification is the same for the two models except for regional characteristics. The first model includes regional university variables and the second includes variables for regions of origin (home states):

(1) Ph.D. = f (REQSAL, AGE, AM, [SEU, NEU, MWU, SWU, WU], RELUS,

RELGLO, CAUC, ASIAN, ASIANI, BLACK, HISPAN, and GENDER),

(2) Ph.D. = f (REQSAL, AGE, AM,[SE, MW, WEST, NE, SW], RELUS, RELGLO,

CAUC, ASIAN, ASIANI, BLACK, HISPAN, GENDER),

where the variables are as defined as in table 1. The regional variables are in brackets in equations (1) and (2).

The REQSAL variable perhaps needs some further explanation. Graduate students pursuing or planning to pursue a Ph.D. provided their estimate of the annual starting salary. Graduate students not planning to pursue a Ph.D. provided an estimate of the

annual starting salary necessary for them to change their mind. Thus, the REQSAL variable represents the perceived opportunity cost of pursuing a Ph.D. in a U.S. agricultural economics department. REQSAL is akin to the reservation price by a seller. REQSAL is expected to be negatively related to the probability of pursuing a Ph.D. On average, those pursuing or wishing to pursue a Ph.D. are willing to settle for a starting salary far less than those who have other plans: $66,682 versus $97,736. Clearly, the 2007-2008 actual estimated starting salary of $73,500 (based on observed recent offers) is far less than the required $97,736, on average, for those not presently interested in pursuing a Ph.D.

AM, being American, is expected to be negatively related to the probability of pursuing a Ph.D. based on the observed ratio of Foreign National to American Ph.D. students in agricultural economics departments in the United States. RELUS (willing to relocate in the United States) and RELGLO (willing to relocate globally) are expected to be positively related to the probability of pursuing a Ph.D. Students aspiring for the Ph.D. should recognize that the Ph.D. market is national and international, not local. Relative to Caucasian (CAUC) as an ethnicity, ASIAN and ASIANI (Indian) are expected to be positively related to the probability of pursuing a Ph.D., and the other ethnicities are expected to be negatively related based on observed representation in graduate school applications. For the remaining independent variables there are no *a priori* expectations on the direction of impact. These factors of life can affect goals and aspirations, but the direction is uncertain.

Probit model 1 (with universities by region) fits the data well, table 2. The likelihood ratio is 77.08 with 14 degrees of freedom and p-value of 0.00. The Estrella R-

square is 0.57 (Estrella 1998). The percentage of correct predictions is 83.6% while that from a naive model is 55.7%. Table 3 shows how universities, with graduate students responding to the survey, are assigned by region.

The coefficients, t-ratios, and marginal effects for Probit model 1 are provided in table 2. Of the independent variables hypothesized to be important, only REQSAL (required salary), AM (American), MWU (Midwestern university), and RELGLO (willing to relocate globally) had coefficients significant at the 0.05 level or better. The negative coefficient for REQSAL was as expected. Those with higher required salaries tend to be reluctant to apply themselves to the long and arduous task necessary for the Ph.D. given the perceived actual starting salary. The negative coefficient for AM (American) was also expected. Fewer Americans seem to be interested in a Ph.D. in agricultural economics departments. The positive coefficient for MWU indicates that graduate students are more likely to seek a Ph.D. in Midwestern universities relative to those in southeastern universities (the regional intercept variable). Apparently, there were no differences with respect to universities in other regions. The positive coefficient for RELGLO (willing to relocate globally) was in line with expectations as the Ph.D. market is certainly global in scope.

In order to determine the strength of the variables and to predict the effects of each of the relevant variables on the probability of seeking a Ph.D., the marginal-effect concept is useful. Marginal effects are measures of responsiveness, measures of how the likelihood of striving for a Ph.D. are effected by factors found to be linked to the quest for the Ph.D. Marginal effects herein measure the extent to which important factors contribute to the probability of pursuing a Ph.D.

The marginal effect for REQSAL is -0.014, table 2. As the required starting salary increases by $1,000, the probability of striving for a Ph.D. declines by about 1.4%, all else equal. This indicates that the perceived actual starting salary with a Ph.D. is sufficiently low to be a stumbling block for many. The marginal effect for AM is quite large, -0.707. In other words, switching from the status of Foreign National to American student lowers the probability of pursuing a Ph.D. by 70.7%, all else equal. A marginal effect of 0.456 for MWU means that switching university regions from Southeastern to Midwestern increases the probability of seeking a Ph.D. by 45.6%, all else equal. Finally, a marginal value of 0.173 for RELGLO indicates that switching from a status of not willing to relocate globally to a status of willing to relocate globally, raises the probability of the Ph.D. quest by 17.3%, all else equal.

As with the first model, Probit model 2 (with state of origin or home state by region) fits the data well, table 4. The likelihood ratio is 71.13 with 14 degrees of freedom and p-value of 0.00. The Estrella R-square is 0.46. The percentage of correct predictions is 80.6% while that from a naïve model is 54.9%. Table 5 shows how graduate student states of origin or home states are assigned by region.

The results for model 2 are very similar to those of the first model, table 4. Of the independent variables hypothesized to be important, only REQSAL, AM, and RELGLO had coefficients significant at the 0.05 level or better. The only real difference in terms of significant coefficients between models 1 and 2 is that none of the regional variable coefficients were significant in model 2 (with state of origin or home state by region). Other differences pertain to the magnitudes of marginal effects. The marginal effect for REQSAL in model 2 is -1.0% versus -1.4% in model 1, not too different. The marginal

effect for AM is -51.7% in model 2 as compared to -70.7% in model 1, still substantial but less in model 2. The marginal effect is higher for RELGLO in model 2, 31.9% versus 17.3% in model 1.

Conclusions and Implications

In conclusion, the profile of a graduate student pursuing or planning to pursue a Ph.D. in an agricultural economics department in the United States seems to have little to do with age, home region, willingness to relocate within the United States, ethnicity, or gender. Instead, the paramount factors in a profile of those willing to pay the price in terms of sacrifice and effort to obtain a Ph.D. encompass willingness to accept a relatively low starting salary with a Ph.D., likely to be a Foreign National, prone to be in a Midwestern university, and willing to relocate globally.

Money is a huge issue. Generally, the Ph.D. starting salary would have to increase dramatically to change the minds of graduate students not intending to pursue a Ph.D. Moreover, Americans generally are not interested in seeking a Ph.D. in agricultural economics. Depending on model results; Americans are 52 to 71% less likely to be interested in going for the Ph.D. The increased likelihood of striving for the Ph.D. in Midwestern universities, which is substantial, is probably because these schools have been turning out agricultural economics Ph.D.s in large numbers for many years. The association of a willingness to relocate globally with an increase in the probability of the Ph.D. quest shows a global market perspective and reflects the large number of Foreign Nationals in U.S. Ph.D. programs.

The ramifications for recruiting prospective domestic Ph.D. students are daunting. Clearly, the issue is money. There is no transparent market for new Ph.D.s in agricultural

economics; yet, there is always a going starting rate. The only known salary tables are those published by the USDA. Without public policy intervention, akin to that necessary to make the all-volunteer U.S. military viable, U.S. land-grant institutions and the private sector will largely have to employ Foreign Nationals. Since the USDA requires citizenship for employment, the USDA will have to drop the citizenship requirement or reach into the M.S. pool to fill positions.

References

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Table 1. Description, Mean, and Standard Deviation of Variables Included in the Probit Models

Variable	Explanation	Mean	Std. Dev.
PHD	Pursuing or will pursue the Ph.D. (1=yes, 0=no)	0.451	0.500
REQSAL	Required Annual Starting Salary in $1,000 with a Ph.D.	83.842	45.528
AGE	Graduate Student Age	27.194	5.843
AM	American Graduate Student (1=yes, 0=no)	0.743	0.438
SEU	U.S. Southeast university region – intercept variable (1=yes, 0=no)	0.299	0.459
NEU	U.S. Northeast university region (1=yes, 0=no)	0.016	0.128
MWU	U.S. Midwest university region (1=yes, 0=no)	0.254	0.437
SWU	U.S. Southwest university region (1=yes, 0=no)	0.123	0.330
WU	U.S. West university region (1=yes, 0=no)	0.148	0.356
SE	U.S. Southeast home region – intercept variable (1=yes, 0=no)	0.459	0.500
MW	U.S. Midwest home region (1=yes, 0=no)	0.181	0.386
WEST	U.S. West home region (1=yes, 0=no)	0.188	0.392
NE	U.S. Northeast home region (1=yes, 0=no)	0.042	0.201
SW	U.S. Southwest home region (1=yes, 0=no)	0.035	0.184
RELUS	Willing to relocate within the U.S. (1=yes, 0=no)	0.833	0.374
RELGLO	Willing to relocate globally (1=yes, 0=no)	0.646	0.480
CAUC	Caucasian ethnic group – intercept variable (1=yes, 0=no)	0.722	0.449
ASIAN	Asian ethnic group (1=yes, 0=no)	0.132	0.340
ASIANI	Asian-Indian ethnic group (1=yes, 0=no)	0.014	0.117
BLACK	Black ethnic group (1=yes, 0=no)	0.056	0.230
HISPAN	Hispanic ethnic group (1=yes, 0=no)	0.063	0.243
GENDER	Graduate student gender (1=male, 0=female)	0.569	0.497

Note: N = 144 except for university regional variables where N = 122.

Table 2. Probit Model 1 Coefficients, <u>t</u> Ratios and Marginal Effects

Variable	Coefficient	t Ratio	Marginal Effect
REQSAL	-0.038	-4.56	-0.014
AGE	-0.068	-1.41	
AM	-2.416	-3.23	-0.707
NEU	0.483	0.35	
MWU	1.214	3.06	0.456
SWU	0.609	1.09	
WU	0.153	0.26	
RELUS	0.694	1.28	
RELGLO	0.738	2.10	0.173
ASIAN	-0.789	-1.01	
ASIANI	-0.725	-0.08	
BLACK	-0.292	-0.36	
HISPAN	-1.767	-1.89	
GENDER	0.466	1.32	
Constant	4.875	2.62	
Likelihood ratio	77.08 with 14 d.f. and p-value = 0.00		
Estrella R^2	0.57		
% Correct predictions	0.84		
Naïve model % correct predictions	0.56		
Number of observations	122		

Table 3. Universities by Region

Southeast	Northeast	Midwest	Southwest	West
University of Georgia	University of Delaware	University of Illinois	Oklahoma State University	University of Wyoming
University of Florida	University of Maryland	Iowa State University	New Mexico State University	Colorado State University
University of Tennessee		Kansas State University	Texas A&M University	Oregon State University
University of Arkansas		Michigan State University	University of Arizona	
University of Kentucky		University of Missouri		
Mississippi State University		Ohio State University		
Virginia Tech		University of Wisconsin		
		Purdue University		
		South Dakota State University		

Table 4. Probit Model 2 Coefficients, t Ratios, and Marginal Effects

Variable	Coefficient	t Ratio	Marginal Effect
REQSAL	-0.026	-4.12	-0.010
AGE	-0.020	-0.70	
AM	-1.921	-3.44	-0.517
MW	0.396	1.06	
WEST	0.060	0.14	
NE	0.726	1.13	
SW	0.156	0.20	
RELUS	0.271	0.65	
RELGLO	1.005	3.32	0.319
ASIAN	-0.858	-1.46	
ASIANI	-0.786	-0.45	
BLACK	-0.352	-0.55	
HISPAN	-1.187	-1.63	
GENDER	0.409	1.40	
Constant	2.840	2.33	
Likelihood Ratio	71.13 with 14 d.f. and p-value = 0.00		
Estrella R-Square	0.46		
Percentage of Right Prediction	0.81		
Naïve Model Percentage of Right Predictions	0.55		
Number of Observations	144		

Table 5. Home State by Region

Southeast	Northeast	Midwest	Southwest	West
Arkansas	Delaware	Illinois	New Mexico	California
Florida	Maryland	Indiana	Texas	Colorado
Georgia	Massachusetts	Iowa		Montana
Kentucky	New Hampshire	Kansas		Nevada
Louisiana	New York	Michigan		Wyoming
Mississippi	Pennsylvania	Missouri		
Tennessee		Ohio		
Virginia		South Dakota		
West Virginia		Wisconsin		