

Potential Factors Contributing to Undergraduate Enrollment in Agricultural Economics and Agricultural Business and Management at Land-grant Institutions

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Abstract

This study examines factors that affect undergraduates' enrollment in agricultural economics and agricultural business and management (AEABM) studies at land-grant institutions using a cross sectional demand model. Data for students enrolled in agribusiness, ethnicity, and sex were collected through Food and Agricultural Information Education Systems (FAIES). In-state tuition and financial aid data were obtained via the Integrated Post Education Data System (IPEDS) on the basis of land-grant institutions. The sample size is comprised of 53 land-grant institutions that offer undergraduate degree in AEABM. We utilize a cross section model to identify factors that influence enrollment in AEABM as a major and discuss future implications for 1890 and 1862 land-grant institutions and the recruitment of prospective students. Preliminary results indicate that there are more males enrolled in agricultural economics and agricultural business and management studies than females. Further, Caucasian enrollment is more than any other ethnicities at land-grant institutions as we anticipated. Finally, preliminary findings show that financial aid/scholarships may have a positive influence on enrollment in AEABM studies.

Introduction

Recruitment and retention of undergraduate students in the field of agricultural economics and agricultural business and management (AEABM) studies at land-grant institutions has proven to be challenging. Ensuring that these institutions supply well-qualified students in the field of study is an important step in increasing and enhancing the quality of agricultural programs at

land-grant universities. According to Perry (2010), both the number of undergraduate students in standalone agricultural economics and the number of departments offering the program have declined constantly over the years. The number of baccalaureate degrees awarded in standalone agricultural economics decreased from 1541 in 1991 to 545 in 2006. Although the overall number of degrees awarded in schools and colleges of agriculture in the United States has increased by 37% between 1991 and 2006, the number of minority undergraduates' enrollment has also remained low. Further, the number of undergraduate degrees awarded in resource and applied economics, a major growth discipline under agricultural economics' closely related fields, has increased only by 17% as compared to other fields within the agricultural and natural resources sciences. In addition, enrollment growth in colleges of agriculture and natural resources has outgrown all other degree programs in agricultural and natural resources sciences (Perry, 2010).

Several recruitment and retention programs have been established in attracting these students; however, it has remained a challenge to increase enrollment. Further, land-grant universities reported to have a placement ratio between 90 to 98 % within six months of graduation. Understanding students' influences in selecting a major can help schools and colleges of agricultural sciences to design programs that will not only attract high achieving students but will also keep them until they complete the degree. For the last decade, the number of undergraduates in standalone agricultural economics programs has reduced drastically whereas at the higher education level, the trend remains steady

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due to an increase in international students' enrollment (Blank, 1998).

Several studies have been conducted regarding factors that affect enrollment rate in agricultural economics. In 1998, Blank conducted a study examining agricultural economics enrollments and programs from period 1985 to 1996. After surveying 44 schools in North America, Blank (1998) found that the number of enrollment in agricultural economics is declining. Moreover, Blank (1998) added that the enrollment rate of undergraduate students in the agriculture program has decreased by 17% for academic year 1975-1984 to 1985-1996. During the same period, Blank (1998) reported an overall decline of 14% in the average number of enrollment in both undergraduates and graduates in agricultural economics programs. Results also indicated a change in the characteristics of students in the program. Blank (1998) indicated a decline of students in agricultural economics with farm background and an increase in females' enrollment in the program. Blank (1998) also pointed out that several universities changed their curriculum and names of the department programs to reflect the changing characteristics of students. Over the years, agricultural economics programs have changed names to Applied Economics, Resources and Applied Economics, or Applied Economics and Agribusiness to meet the needs of the agricultural industry and to make AEABM studies more marketable to prospective students.

Various studies have identified factors that affect the demand for college education, in particular, the relationship between student enrollment (dependent variable) and income and tuition (independent variable; Bezmen and Depken, 1998; Campbell and Siegel, 1967; Kim, 1984; Yang, 1998; Leslie and Brinkman, 1987; Hossler et al., 1998; Dynarski 1999; Beggs et al., 2006; Shin and Milton, 2008). These studies reveal that tuition is a normal good, implying that as student income or financial aid rises, enrollment in a college or university also rises. They also disclose that there is an inverse relationship between enrollment and tuition; that is, as tuition rises, enrollment in a college or university declines.

Purpose and Objectives

The purpose of this study is to identify factors that influence enrollment in AEABM as a major and to discuss the implications for 1890 and 1862 land-grant institutions. Understanding the challenges in recruiting and retaining students in AEABM can be partially done by identifying factors that influence an individual to select agribusiness as a major. Therefore, the objectives are as follow: (1) to identify the factors that influence

enrollment in AEABM as a major and (2) to discuss the future implications for 1890 and 1862 land-grant institutions and the recruitment of prospective students.

Materials and Methods

We estimate the demand for enrollment in AEABM using previous studies on the demand for higher education model. Our model follows that of Barkley and Parrish (2005), a study which identifies determinants of the selection of a major field of study. Barkley and Parrish (2005) evaluate sociodemographic (gender, age), high school experience (GPA, high school activities, and class size), prior high school experience (4-H activities, agricultural courses), mentors (parents, teachers), agricultural academic programs, and career oriented variables as factors potentially influencing the selection of a major using primary data. However, our model will be estimated using secondary data on student enrollment, tuition, financial aid, ethnicity, the number of farms, and sex.

Data

Data were collected from various sources. The dependent variable denotes the 2007 fall enrollment in AEABM data and was obtained from the Food and Agricultural Information Education System (FAEIS) database (U.S. Department of Agriculture – Food and Agricultural Information Education System, 2012a). Only 1890 and 1862 land-grant institutions are considered in this research. The independent variables, sex and ethnicity are also extracted via the FAEIS database using time period of 2007. Tuition costs and grants for financial aid data are retrieved through the Integrated Postsecondary Education Data Systems (IPEDS) for year 2007 (U.S. Department of Education, 2012). The number of farms within the respective states with our included universities was obtained from the 2007 Census of Agriculture (U.S. Department of Agriculture, National Agricultural Statistics Service, 2007). Data were analyzed using SPSS 20 with a significance level of 5% and 10% (IBM® SPSS® Statistics 20.0. 2011).

Empirical Model

In this study, we take a closer look at land-grant institutions and potential factors influencing undergraduate student enrollment. According to the Association of Public and Land-Grant Universities, "*a land-grant college or university is an institution that has been designated by its state legislature or Congress to receive the benefits of the Morrill Acts of 1862 and 1890.*" The passage of the First Morrill Act (1862) and the Second Morrill Act (1890) provided a higher education curriculum outside that of liberal arts studies

to agricultural and industrial workers. The distinction between 1862 and 1890 land-grant institutions extended separate institutions for blacks (1890s) located primarily in southern states (APLU, 2012). Trends reveal that minority enrollment in AEABM studies have increased over the past decade among Hispanic and non-U.S. citizens; however, African American enrollment has been on the decline (U.S. Department of Agriculture – Food and Agricultural Education Information System, 2012a). In order to gain insight on influences of undergraduate enrollment, we identify factors that affect enrollment at 1890 and 1862 years land-grant institutions offering AEABM programs in the U.S. There are seventeen 1890 land-grant institutions in addition to Tuskegee University; therefore, we collapsed both land-grant institution categories. Ordinary Least Squares is used in the study to compute the analysis with a sample size of 53 land-grant institutions and colleges offering AEABM as a major at the undergraduate level. We estimate our cross sectional demand equation found below:

$$EAGB = f(\text{ETHN}, \text{SEX}, \text{TUIN}, \text{FARM}, \text{FIAD})$$

Where: EAGB = agricultural economics/agribusiness enrollment at 1862 and 1890 land-grant institutions, ETHN = dummy variable, 0-other ethnicities (minority) and 1-Caucasian (majority), SEX = dummy variables, 0-females and 1-males to differentiate gender of students enrolled, TUIN = in-state tuition paid at the university, adjusted for inflation in year 2007, FARM = number of farms within the respective university's state, and FIAD = number of grant aid dollars received by undergraduate students at each institution during year 2007.

The ethnicity (ETHN) dummy variable represented minority and majority enrollment at 1862 and 1890 land-grant institutions. If the institution was categorized as an 1862 institution with a majority Caucasian population, then the institution was assigned 1.0 and 1890 institutions with a greater percentage of minorities enrolled were assigned a 0.0. The sex (SEX) dummy variable represented institutions with a greater percentage of males enrolled versus those with greater percentages of females enrolled in AEABM. The tuition (TUIN) variable denoted in-state tuition paid by students at each respective institution in 2007 adjusted for inflation. Due to the inclusion of the number of farms (FARM) within the respective university's state into the dataset, we adjusted corresponding data on the basis of the most current Census of Agriculture,

which is published every 5 years. The financial aid (FIAD) variable denoted the number of grant aid dollars received by undergraduate students at each institution during 2007.

Results and Discussion

The descriptive statistics for this study are presented in Table 1. Each variable's mean, standard deviation, minimum and maximum are generated and presented for the analysis. Explanatory variables are ethnicity, sex, tuition, number of farms and financial aid. The sample size of this study utilized 53 land-grant institutions that offer AEABM academic programs. Enrollment in agribusiness had a mean of 152 pupils enrolled with a minimum of three enrolled, a maximum of 717 and a standard deviation of 146, which exhibited high variation among all land-grant institutions, which may be a result of the differences in smaller 1890 AEABM academic programs versus larger 1862 AEABM academic programs.

Table 2 shows the representation of males and females enrolled in agribusiness in 2007. The results indicate that there are more males (86.8%) enrolled in AEABM program at land-grant institutions than females (13.2%) in 2007. Shrestha et al. (2011) and Overbay and Broyles (2008) highlighted that an increasing number of females are enrolling in schools and colleges of agriculture. After examining the undergraduate enrollment in AEABM at 1862 and 1890 land-grant institutions from year 2006 to 2010, the U.S. Department of Agriculture – Food and Agricultural Education Information System (2012b) reported that male enrollment in the program has increased by 14.8% in 1862 land-grant universities and by 13.7% at 1890 institutions. On the other hand, female enrollment has grown rapidly especially at 1890 land-grant institutions (24.8%) between 2006 and 2010. For the same years, 1862 institutions have also experienced an increase of 11.6% of female enrollment in the program. Overall, both male and female enrollment has increased; however, the number of male enrollment in AEABM still outweighs those of females, which may be attributed to increases in the Hispanic and/or non-U.S. citizen populations.

Table 2 also represents Caucasians and other ethnicities in this study. In addition, Caucasians represent 84.9% of enrolled undergraduates compared

Table 1. Descriptive Statistics of Variables

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Enrollment in Agribusiness	53	3.00	717.00	152.3962	146.06721
Ethnicity	53	.00	1.00	.8491	.36142
Sex	53	.00	1.00	.8679	.34181
Tuition	53	1723.00	34600.00	5681.0000	4591.20315
Farms	53	2550.00	247500.00	54363.2075	47272.61684
Financial Aid	53	470918.00	162436101.00	60209318.7170	46621316.44828

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Table 2. Enrollment of Undergraduates by Gender and Ethnicity

	Female	Male	Total	Caucasian	Others	Total
Frequency	7	46	53	45	8	53
Percent	13.2	86.8	100	84.9	15.1	100

Table 3. Enrollment of Undergraduates at 1862 and 1892 Institutions by Gender for 2007

	1862		1890	
	Frequency	Percent	Frequency	Percent
Female	1	2.4	6	50
Male	41	97.6	6	50
Total	42	100	12	100

Source: U.S. Department of Agriculture – Food and Agricultural Education Information System, 2012b

to other ethnicities (15.1%). These findings are similar to those in previous studies (Beggs et al., 2006; Dyer et al., 1999).

The number of females (50%) enrolled in AEABM at 1890 land-grant institutions is equal to the number of males (50%; Table 3). This may be due to the changing demographics of students enrolling in the program. According to U.S. Department of Agriculture – Food and Agricultural Education Information System (2012b), female enrollment (19.9%) surpassed male enrollment (9.1%) from 2009 to 2011 in agricultural programs as a whole. In addition, female enrollment in AEABM was reported to increase by 27.8% from 2004 to 2011 compared to male enrollment, which grew by 27.0%. The total enrollment of undergraduate students enrolled in AEABM at 1890 land-grant universities in 2007 is 189 with African-Americans representing 87%, Caucasians 11%, Hispanics 1%, and Native American 1% of this population. The findings revealed that female enrollment in agribusiness represented 2.4% compared to male enrollment, which is 97.6% at 1862 Land-grant institutions in Table 3. The total enrollment of undergraduate students within AEABM at 1862 land-grant institutions in 2007 is 7,251, where Caucasians make up 89%, African Americans 4%, Hispanics 3%, Asian 3%, and Native American 1% of this population.

Preliminary results revealed that student enrollment was weakly but positively correlated with financial aid/scholarships, ethnicity, and sex (Table 4), although financial aid/scholarships showed an insignificant correlation with student enrollment. Stronger, positive and significant correlations were found between student enrollment and tuition. This suggests that an increase in tuition is associated with an increase in student enrollment. Traditionally, when tuition increases, enrollment decreases and vice versa. A possible explanation might be that as long as students have access to loans or financial aid, then a weak increase in tuition will not have a strong impact on enrollment (Shin and Milton, 2008). Shin and Milton (2008) pointed out that

students might not be so sensitive to a change in tuition if the cost of education is still lower than of competing majors or if they can pay for their own tuition. Shin and Milton (2008) explained that an individual will be willing to pay a higher price on education if the expected return is higher. For example, Shin and Milton (2008) found that students are responsive to a price change in tuition in majors such as Physics, Biology, and Business; but not in Engineering, Math, and Education. Another explanation for the positive relationship between tuition and enrollment might be due to the affordability of tuition at public universities compared to private institutions.

Regression analysis is another method of examining factors that are associated with undergraduates' enrollment in AEABM studies. The preliminary findings of the cross sectional demand model explained 56% of the variation for student enrollment in AEABM with tuition, number of farms, ethnicity, sex and financial aid as prospective determinants affecting student decisions to enroll. The summary of the regression analysis transformed in natural logarithm is presented in table 5. The coefficient of ethnicity is positively associated with student enrollment at a 10% level of significance and indicates that a 1% increase in Caucasian population is associated with an increased enrollment in AEABM by .667%. The coefficient of sex is also positively associated with student enrollment with at a 1% level of significance. A sex coefficient of 1.449 implies that a 1% increase in male enrollment is positively associated with enrollment in AEABM program by 1.449 %. The elasticity of student enrollment with respect to tuition is positively associated with enrollment in AEABM by .239 % and is statistically insignificant with student enrollment. As found in other studies, tuition has been found to be inversely related to student enrollment. The

Table 4. Correlation of Student Enrollment and Decision Contributors in AEABM

	Enroll	Tuition	Finaid	Farm	Ethnicity	Sex
Enroll	1	0.485 P = <0.01	0.025 P = 0.850	-0.002 P = 0.988	0.347 P = <0.01	0.301 P = <0.05
Tuition		1	0.0254 P = <0.05	-0.178 P = 0.169	0.199 P = 0.125	0.146 P = 0.263
Finaid			1	-0.002 P = 0.990	0.110 P = 0.397	-0.044 P = 0.737
Farm				1	-0.036 P = 0.781	-0.082 P = 0.530
Ethnicity					1	0.632 P = <0.01
Sex						1

Table 5. Regression Analysis Estimations of Student Enrollment in AEABM

Variables	Estimate	Standard Error	t-value	P-value
Constant	-7.222	2.599	-2.778	.008
Ethnicity	.667	.357	1.870	.068
Sex	1.449	.364	3.985	.000
LnTuition	.239	.228	1.050	.299
LnNumberof Farms	.438	.117	3.740	.001
LnFinancial Aid	.189	.101	1.861	.069

zMSE= 0.606, SSE = 28.487, DF = 52, and R-Square = 0.559

number of farms is positively associated with the number of students enrolled in AEABM programs (.438) and is statistically significant at a 5% level of significance. The elasticity of enrollment with respect to financial aid suggests that 1% increase in the number of financial aid awarded is positively associated with the number of enrollment in AEABM programs by .189% at a 10% level of significance.

Limitations

The preliminary findings of this study suggest that there are possibly many other factors that may influence students' decisions to enroll in AEABM programs. Several factors have been identified by other researchers as important factors influencing students' decisions (Shrestha et al., 2011; Herren et al., 2011). However, these were beyond the purview of this study and should be investigated further. We collapsed both land-grant institution categories and this placed constraints on the empirical analysis; however, it did provide insight on factors contributing to land-grant enrollment overall and provided descriptive statistics for implications in overall enrollment including majority and minority enrollment. Data limitations resulted in financial aid dollars reflective of the entire institution rather than dollars received by schools and colleges of agriculture. Although there is no evidence to indicate that tuition and financial aid/scholarship are significant factors contributing to enrollment in AEABM studies, these preliminary findings provide a basis for further research. Other limitations involved not including 1994 land-grant institutions, which could provide more insight on the American Indian/Native American population, and other non-land grant institutions offering agricultural sciences. Also, using farm data from the 2007 Census of Agriculture restricted a trend analysis over a longer period of time.

Summary

The status of agricultural economics and agricultural business and management (AEABM) studies is a concern, especially at land-grant institutions. Several land-grant institutions have eliminated programs due to budget cuts and low productivity. In this study, we examined the factors that affect undergraduates' enrollment in agricultural/economics at land-grant institutions. We evaluated determinants such as ethnicity, sex, tuition, the number of farms, and financial aid as factors that may contribute to a prospective student's decision to enroll in AEABM. Based on the analysis, Caucasians represent 84.9% of students enrolled in undergraduate programs as compared to other ethnicities (15.1%). It appears that the struggle to attract minorities in the AEABM

program will probably continue. Several strategies such as changing curriculum, partnering with agribusiness firms, organizing various workshops to educate students about the AEABM field are already in place to increase enrollment. These initiatives have been effective in increasing enrollment, but not drastically. On the other hand, results showed that the independent variables considered in this study were not strong factors that contributed to increase enrollment in the programs. This can possibly be explained by evaluating an individual's sociodemographic and attitudinal choices to enroll in the program.

In future research, it may be worthwhile to investigate associations of financial aid/scholarships and enrollment. Prospective targets for land-grant institutions might include both female and male, Hispanics, Asians, and Native Americans. Overall results showed that at 1890s, the number of female enrollment is equal male enrollment in 2007. Traditionally, males have outweighed females in enrolling in AEABM program. Due to the changing demographics of students and the increasing number of minorities, 1890s can still attract more students in AEABM program at these institutions by targeting both female and male. Since these schools are noticing more and more females enrolling in the program, they are encouraged to continue to recruit this group. In addition, the majority of students entering agribusiness programs at 1890s are African-Americans (87%); this implies that administrators can increase the number of minorities' enrolled by providing funding/financial aid. That is, the majority of 1890 land-grant institution populations seek financial aid/scholarship or further assistance. The preliminary findings indicate that Caucasian enrollment is about 11% at 1890s. This suggests that 1890 land-grant universities can continue to target this group and other minorities such as Hispanics and Asians.

Contrary to 1890 land-grant institutions, 1862 land-grant universities have more diversity in AEABM programs. At the same time, they can also increase enrollment of minority by targeting Native Americans, Asians, Hispanics, and African Americans. The majority of students enrolled at 1862 is Caucasian (89%), which outweighs any other ethnicity. In closing, agricultural leaders should continue to improve their recruitment and retention efforts to attract prospective undergraduate students at land-grant universities in AEABM academic programs.

Potential Factors Contributing

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