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ANALYSIS OF SOUTH CAROLINA HIGH SCHOOL STUDENTS' INTEREST IN SELECTED MAJORS: AGRICULTURE, BUSINESS, ECONOMICS, AND ENVIRONMENTAL AND NATURAL RESOURCES

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ANALYSIS OF SOUTH CAROLINA HIGH SCHOOL STUDENTS' INTEREST IN SELECTED MAJORS: AGRICULTURE, BUSINESS, ECONOMICS, AND ENVIRONMENTAL AND NATURAL RESOURCES

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ABSTRACT

The research presented here focuses on high school students' level of interest in economics, business, environmental and natural resource, and agriculture as possible college majors. Data is derived from quantitative online survey that had been distributed to high school students in business and economics courses across the state of South Carolina during spring 2011, fall 2011, and spring 2012 semesters. Probit and ordered probit models are used analyze high school students' strength of interest in certain majors. Relatively few students are interested in Environment and Agriculture Majors. Females are less likely interested in economics, environmental and natural resource, and agriculture majors than males, but have similar interest in business. Students who have the lowest GPA level, less than 2.0, show little interest in any of these majors, but relatively, they show higher interest in business major. If high school offers environmental classes and clubs, students are tend to be more interested in an environment major compared to other students without environmental classes and clubs in their schools. Students with parents whose jobs are involved with agriculture are more likely to be interested in environment and agriculture majors.

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SECTION 1

INTRODUCTION

The USDA has reported 16% fewer qualified graduates than employment opportunities in agricultural business and management, while environmental and natural resource opportunities continue to grow (Goecker et al, 2006). Those in colleges that offer majors in these areas may wonder what can be done to attract more students to fill this nationwide shortage.

According to the news of Bureau of Labor Statistics, approximately 3.1 million youth age 16 to 24 who graduated from high school in 2011, about 2.1 million were likely to choose a specific major and to begin their college life. Thus, with such a large pool of students each year it might be useful to analyze what factors influence high school students' choice of major. For example, are there similarities across high school students interested in general environment studies and those interested in agriculture? Which students are interested in business and economics but do not consider agricultural business or environmental management?

Therefore, the motivation of this research is to obtain an improved understanding there are some basic factors significantly correlated with students' choice of Economics, for example, and other factors correlated with the choice of a major in environmental and natural resources. For instance, involvement in an environmental club would likely increase the probability of high school students' interest in environment related major to some degree. Some high schools provide agriculture courses, enrollment in which would be expected to increase the probability of students' interest in agriculture related majors

as well. Parental occupation, socioeconomic status, and gender may also have a significant influence on students' choices.

Most departments regularly update curricula to produce graduates qualified for employment in their field. What is missing in the agricultural and environmental economics disciplines is enough students desiring to enter these fields. With more than enough employment opportunities upon graduation, an improved understanding of why students may not be entering these fields is necessary to begin addressing this shortfall. Thus, the objectives of this research are as follows:

The research presented here is a piece of a larger project that assesses how students get information about colleges, what factors that influences their choices, and their level of awareness of opportunities in economics, business, environmental and natural resource, and agriculture. This portion of the research presented here focuses on high school students' level of interest in economics, business, environmental and natural resource, and agriculture as possible majors and sociodemographic characteristics correlated with their interest.

The factors influencing college or high school students' choice of major have been estimated frequently in the literature. No one has surveyed high school students about their strength of interest in selected fields, nor has one any analyzed the contribution of extracurricular activities and specialized high school courses in influencing these choices.

In this paper, I use the data from a survey of 527 students from all across the South Carolina, which was conducted from spring 2011 to spring 2012, three semesters

overall. The basic goal of this survey was to measure students' preferences for certain majors and the strength of their interest. Probit estimates are used to reveal important factors correlated with high school students' interest in each major. The probit model in this paper analyzes high school students' interest in Economics, Business, Environment/Nature Resources, and Agriculture majors based upon selected demographics, socioeconomics, and students' experiences. The demographics include family size, grade level, gender, and race. Socioeconomic variables include family income, parents' job, and students' experiences include their grade point average (GPA), time spent studying, plans post-high school, and whether or not their high school offers agricultural or environmental classes or clubs. The model allows for comparison and ranking of factors affecting the interest in selecting a specific major.

To provide information about the intensity of high school students' interest in selected majors, an ordered probit model is used to predict the probability of increasing interest in a specific major. For each major an ordered probit model models the strength of interest in major as a function of the same variables included in the probit models.

This research provides information about factors influencing the probability of interest in a selected major. These results will help improve the understanding of which high school students may be interested in some majors and uninterested in other majors. Meanwhile, the results will help different types of colleges or institutions to target some specific groups of students who might have strong interest in studying majors offered in their schools.

SECTION 2

LITERATURE REVIEW

Why do students initially select particular majors and what factors relate to any later changes in those choices? The majority of the literature focuses on student perceptions and choice of institution and major. There is a considerable body of work examining the factors influencing college students' choice of major finding that interest in the subject was the most important factor for incoming freshmen, regardless of gender. Beggs, Bantham and Taylor (2006) examined six primary aspects in the area of major choice. First, students' choices are influenced by the direct or indirect recommendations of people they know. Advice from family members and high school teachers appeared to be the predominant sources of information.

Second, students choose a major that match with their interests. Third, a job prospect is an important consideration in selecting academic majors. This category appears to focus primarily on the functional/utilitarian outcomes associated with the selected major and subsequent career path. Fourth, although financial considerations are typically viewed as a specific job characteristic, this factor was mentioned frequently by the authors. Again, this factor appears to focus primarily on the functional/ utilitarian outcomes associated with the selected major and subsequent career path. After graduation, many students want to find a job with financial security. Fifth, psycho/social benefits are important for school students in deciding their major choices. Some students were influenced by the importance of future psychological benefits resulting from their major selection and the job that the major eventually leads to. Some students felt it was

important that the perceived social benefit of selecting a major that is supported by their social network. Finally, some students place significant emphasis on the attributes associated directly with a major when making their decision of major, such as faculty and reputation of the department. When rating the importance of these factors, match with interest is the top.

In a more specific study of business majors it was found that students choosing business majors (as opposed to nonbusiness majors) are affected by parental occupation and socioeconomic status, with the strength of that effect differing by gender (Lepel, Williams, & Waldauer, 2001). Within the business school, choice of a specific major is linked to personality traits, values, and interpersonal behavior and is again mediated by gender differences (Giacomino & Akers, 1998; Noel et al., 2003). In general, although factors have been found to vary somewhat by specific business major choice, students appear to be strongly influenced by their interest in the subject, the availability of jobs, their aptitude for the subject, and the earnings potential related to that major. (Kim etal., 2002; Mauldin et al., 2000; Pritchard et al., 2004).

In an investigation of the differential influences on students as they progress through their academic career, Mauldin et. al. (2000) found that accounting majors tended to decide on their majors during the semester in which they took the first accounting course. The course itself was not particularly important in making the choice, but the accounting instructor was influential. Cohen et al. (1993) found that the influences on accounting majors changed somewhat with the increased experience of the student in the major. Similarly, Strasser, Ozgur, and Schroeder (2002) surveyed both

sophomore and senior business majors and found that although sophomores and seniors listed the same influences on choice of major, sophomores placed more emphasis on interest in the subject and seniors placed more importance on career objectives. In sum, factors influence business student include the interest in major, potential for career advancement, and potential job opportunities (Malgwi, Howe & Burnaby 2010).

Gender differences in nonbusiness majors have been studied fairly frequently, but there is less research related to business majors and gender differences. For example, investigating nonbusiness majors, Lackland and DeLisi (2001) found a gender difference in students' perceptions about their aptitudes for different majors, their humanitarian concerns regarding the various majors, and the utility of available majors. Turner and Bowen, in their 1999 study of gender differences' relation to SAT score differences, concluded that abilities as measured by the SAT did little to explain gender differences in choices of a nonbusiness major. In terms of salary expectations, students (both male and female) in male-dominated majors tended to expect higher salaries than did students in non–male-dominated majors (Sumner & Brown, 1996). Giacomino et al. (1998) suggested that there were significant differences in the values held by different business majors and that gender differences further affected these relationships.

Generally speaking, the basic factors found to be significant in choosing a major across many studies could be categorized as follows: Future financial and economic security, level of job risk, Growing/Thriving fields, Students prefer less physical work involved.

However all of the studies are of current college students, no one has surveyed high school students about their strength of interest in the specific fields analyzed here, and no one has analyzed the contribution of extracurricular activities and specialized high school courses in influencing college major choice.

SECTION 3

DATA

3.1 Survey Approach

During the fall 2010 semester, a series of focus groups were held with current Clemson University and Tri-County Technical College students concentrating on factors influencing their choice of school and major and their awareness of opportunities in agricultural and environmental economics. Information gathered from these meetings was used to formulate an online survey for high school students. A quantitative online survey for high school students was developed based on findings of previous literature regarding choice of college and field of study, as well as the information gathered from focus group.

The survey was designed using Qualtrex. Questions were reviewed internally and externally in an iterative process of revision. Pretesting was conducted by a class of 25 high school honors Economics students on April 8, 2011 and responses to the pretest were used to finalize the survey. The survey was distributed to high school students in business and economics courses across the state of South Carolina during spring 2011, fall 2011, and spring 2012 semesters.

3.2 Data

In addition to measuring high school students' interest in majors and the strength of their interests, the survey also asked about demographics, socioeconomics, and students' related experiences. 630 students were surveyed, and 527 complete samples were analyzed using STATA. Only those respondents who indicated plans to attend

college after high school are included in the analysis. Males are in 50.19% in the survey. Students were surveyed by 23.38% freshmen, 23.62% sophomore, 22.77% junior, and 25.24% senior. Several important variables are considered in the analysis of high students' interest and their strength of preferences in Economics, Business, Environmental &Natural Resource, and Agriculture majors. Summary statistics are shown in Table 3.2-1.

Table 3.2-1 Summary Statistics for all the Variables

Variables	Obs	Mean	Std. Dev.	Min	Max
business (business major)	516	2.709302	1.307481	1	5
econ (economics major)	504	1.986111	1.089351	1	5
envir (environmental major)	511	2.358121	1.299671	1	5
agri (agriculture major)	515	2.299029	1.415554	1	5
busi_int (interested in business major)	527	.5370019	.4991027	0	1
econ_int (interested in economics major)	527	.2732448	.4460489	0	1
envir_int (interested in environment major)	527	.4250474	.4948199	0	1
agri_int (interested in agriculture major)	527	.3946869	.4892477	0	1
male	526	.5019011	.5004723	0	1
time_study	519	2.763006	2.044793	1	11
yearinh (grade level in high school)	527	2.468691	1.133011	1	4
GPA (Grade Points Average)	515	3.638835	1.128705	1	5
white	524	.6374046	.4812088	0	1
black	524	.2175573	.4129789	0	1
Job_bus (parents' job related to business field)	527	.1726755	.3783256	0	1
Job_prof (parents'job related to professional field)	527	.0398482	.1957883	0	1
Job_agri (parents' job related to agriculture field)	527	.1290323	.3355542	0	1
Fouryr (students have 4 year college plan after high school)	527	.5256167	.4998178	0	1
sch_envir_class (school offers environmental classes)	531	.6214689	.4854783	0	1
sch_envir_club (school has environmental club)	527	.4781784	.4999982	0	1
sch_agri_class (school offers agriculture classes)	533	.7110694	.4536914	0	1
sch_agri_club (school has environmental club)	534	.6891386	.4632802	0	1

Interest was measured on a scale of 1-5 in the survey, where 1 is not at all interested, 2 is somewhat interested, 3 is moderately interested, 4 is very interested, 5 is extremely interested. We determine that if a student is interested in a major bigger than level 2, this student shows interest in this major. In other words, for example, if a student says he/she is in level 2 of somewhat interested in economics major, he/she will be considered not interested in economics major. Figure 1 shows the surveyed students level of interest in each of the four majors.

3.3 Data Analysis

Comparing to a relatively popular general major such as business, students show less interest in majoring in economics, agriculture, and environment, likely for different reasons, but the survey analyzed here did not determine the reasons for choices.

Some gender differences in major preference are apparent as shown in Figure 2. In general, females are less interested than males in majoring in economics, environment, and agriculture, but have similar interest in business.

Figure 3 illustrates level of interest for each class level. Relatively few students are interested in economics, a field of study many may perceive to be academically challenging. Similarly, relatively few students are interested in environmental and agricultural majors, which may be thought by students to relate to hard physical work to some degree.

Figure 4 shows an overview of high school students' interests in each major in relative to their GPA level. Students who have the lowest GPA level, less than 2.0, showed little interest in any of these majors, but relatively, but they show higher interest

in business major. Business major is a popular major because students may think it will be easier to find a job in future work market. It is also fairly general, offering more choices later such as management, marketing, and finance.

SECTION 4

METHODOLOGY

4.1 Model-Theoretical

A questionnaire was provided to 21 high schools located throughout South Carolina. This survey sampled approximately 630 students from the period of spring 2011 to spring 2012, with 527 were gathered and analyzed using STATA. Specifically, according to the variables I considered in the model, samples contained diversity in terms of age, gender, grade level, family income, household size, students' gpa, time spent studying, parental occupation, plans post-high school, whether or not high school offers environmental/agriculture classes or clubs, and strength of interest in four majors (Business, Economics, Agriculture, Environment/Nature resources).

4.1.1 Probit Model

Linear regression analysis is a statistical method commonly used by social science researchers. This method, however, assumes a continuous dependent variable. Thus, the model proves inappropriate for the analysis of many behaviors or decisions measured in non-continuous manner. The nature of many social phenomena is discrete rather than continuous, for example the choice by high school students of whether or not to study a particular major.

In cases such as these, the adoption of a different model specification is required. One such alternative is probit analysis. The probit model is a probability model with two categories in the dependent variable. Probit analysis is based on the cumulative normal probability distribution. The binary dependent variable, y, takes on the values of zero and

one. The outcomes of y are mutually exclusive and exhaustive. The dependent variable, y, depends on K observable variables, where k= 1, …, K.

While the values of zero and one are observed for the dependent variable in probit model, there is a latent, unobserved continuous variable, y*.

$$y^* = \sum_{k=1}^{K} \beta_k x_k + \varepsilon$$

$$\varepsilon \text{ is } \sim (0, \sigma^2)$$

The dummy variable, y, is observed and is determined by y* as follows:

$$\text{Prob } (y=1) = \text{Prob } (\textstyle\sum_{k=1}^{K} \beta_k x_k + \varepsilon > 0)$$

$$= \text{Prob } (\varepsilon > -\textstyle\sum_{k=1}^{K} \beta_k x_k)$$

$$= 1 - \Phi(-\textstyle\sum_{k=1}^{K} \beta_k x_k)$$

where Φ is the cumulative distribution function of ε.

The probit model assumes that the data are generated from a random sample of size N with a sample observation denoted by i, i= 1,…,N. Thus the observations of y must be statistically independent of each other. Additionally, the model assumes that the independent variables are random variables. There is no exact linear dependence among the x_k 's. This implies that N > K, that each x_k has some variation across observations (aside from the constant term), and that no two or more x_k's are perfectly correlated.

The Maximum Likelihood Estimation (MLE) technique is used to estimate probit parameters. Maximum Likelihood Estimation focuses on choosing parameter estimates that give the highest probability or likelihood of obtaining the observed sample **y**. The

main principle of MLE is to choose as an estimate of β the set of K numbers that would maximize the likelihood of having observed this particular **y**.

4.1.2 Ordered Probit Model

In some instances response categories are inherently ordered. Thus, the dependent variable may be discrete as well as ordinal. Under these circumstances, conventional regression analysis is not appropriate. Instead, the ordered probit model may be used to estimate such models where the dependent variable associated with more than two outcomes is discrete and ordered.

The ordered probit model is a latent regression where

$$y^* = \sum_{k=1}^{K} \beta_k x_k + \varepsilon$$

Where y* is the unobserved latent index determined by observed factors (xs) and unobserved factors (ε) and ε is normally distributed.

$$y = 1 \text{ if } y^* \leq \mu_1$$

$$y = 2 \text{ if } \mu_1 < y^* \leq \mu_2,$$

$$y = 3 \text{ if } \mu_2 < y^* \leq \mu_3,$$

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$$y = J \text{ if } \mu_{j-1} < y^*,$$

where y is observed in J ordered categories. The unknown threshold levels (μs) are to be estimated with the βs. The probability that the observed y is in category j is shown as follows:

$$\text{Prob (y=1)} = 1 - \Phi[\mu_{j-1} - \sum_{k=1}^{K} \beta_k x_k]$$

The Prob (y=J) is obtained by taking the difference between two adjacent cumulative probabilities with the exception of the first and last categories where: Prob (y≤1) = Prob (y=0) and Prob (y ≥ J) =1.

4.2 Empirical Model

4.2.1 Specification of the Probit Model

Several demographic variables are included in the probit model: year in high school, race, gender, family size, and household income. Additionally, students' academic characteristics such as time spent in studying, plans post-high school, and GPA are included. Some other variables that explain students' background are included as well, such as parents' profession and whether or not the high school offers major related classes or has extracurricular clubs. For example, whether or not a student's high school has environmental classes or clubs is included in explaining the high school students' interest in an environmental major.

For a selected major, the specification of the probit model is as follows,

$$\mathbf{y^*_{ki} = \beta_{k0} + \beta_{k1}\, gender + \beta_{k2}\, RACE1 + \beta_{k3}\, RACE2 + \beta_{k4}\, yearinh + \beta_{k5}\, Fouryr + \beta_{k6}\, time\_study + \beta_{k7}\, gpa + \beta_{k8}\, JOB + \beta_{k9}\, CLASS + \beta_{k10}\, EXTRACURRICULAR}$$

$$y = \begin{cases} 1 \; if \; students \; are \; interested \; in \; major \; k \\ 0 \; if \; students \; are \; not \; interested \; in \; major \; k \end{cases}$$

$$where, \qquad k = \begin{cases} 1\ for\ Economics\ major \\ 2\ for\ Business\ major \\ 3 \text{ for Environmental major} \\ 4\ for\ Agriculture\ major \end{cases}$$

The probit model estimates the impact the independent variables have on a student's interest in a selected major. The model also predicts probabilities of change in certain interest under several simulated variable levels. The explanatory variables are shown in Table 4.2.1-1.

Table 4.2.1-1 Variables and Descriptions

Variable	Description
male	=1 if Male, =0 Female
white	=1 if white, 0 not white
black	=1 if Black, 0 not Black
yearinh	Year in high school =1 Freshmen, 2 sophomore, 3 junior, 4 senior
time_study	Continuous variable from 1 to 11, hours per week
GPA	Category variable:1-5: 1-GPA<2.0; 2-GPA 2.0-2.49; 3-GPA 2.5-2.99; 4-GPA 3.0-3.49; 5-GPA>3.5
JOB	is defined as **job_bus** and **job_prof** for analyzing business and economics majors. job_bus =1, parents' job in business field (combine banking, management, retail trade, wholesale trade), otherwise = 0. job_prof =1, parents' job in professional, scientific, technology, otherwise = 0. is defined as **job_agri** for analyzing environment and agriculture major. job_agri = 1, parents' job in Food/agriculture field (combine accommodations and agriculture), otherwise = 0.
CLASS	is defined as **sch_agri_class** for analyzing agriculture major, = 1 if high school offers agricultural classes, otherwise = 0. is defined as **sch_envir_class** for analyzing environment major, =1 if high school offers environmental classes, otherwise = 0.
EXTRACURRICULAR	is defined as **sch_agri_club** for analyzing agriculture major, = 1 if high school has agricultural clubs, otherwise = 0. is defined as **sch_envir_club** for analyzing environment major, =1 if high school has environmental clubs, otherwise = 0.
Fouryr	=1, students who have plans to attend a 4 year college/university immediately after high school studying, =0 either 2 year technical school or 2 year school with plans to transfer to 4-year College/University.

4.2.2 Ordered Probit Model Specification

Ordered probit models are used to analyze high-school students' choice of majors and the intensity of their interest in selected majors. Four different majors, Economics, Business, Agriculture, Environmental & Nature Resource, will be discussed specifically. On a scale from 1 to 5 for the intensity of interest in a major, 1 represents not interested, 2 means somewhat interested, 3 is moderately interested, 4 is very interested, and 5 is extremely interested. The explanatory variables in the ordered probit models are the same as in the probit models as shown in Table 4.2.1-1.

For a selected major, the specification of the ordered probit model is as follows,

$$\mathbf{y^{*}_{ki} = \beta_{k0} + \beta_{k1}\,gender + \beta_{k2}\,white + \beta_{k3}\,black + \beta_{k4}\,yearinh + \beta_{k5}\,Fouryr + \beta_{k6}\,time\_study + \beta_{k7}\,GPA + \beta_{k8}\,JOB + \beta_{k9}\,CLASS + \beta_{k10}\,EXTRACURRICULAR}$$

$$y = \begin{cases} 1\ if\ students\ are\ not\ interested\ in\ major\ k \\ 2\ if\ students\ are\ somwhat\ interested\ in\ major\ k \\ 3\ if\ students\ are\ moderately\ interested\ in\ major\ k \\ 4\ if\ students\ are\ very\ interested\ in\ major\ k \\ 5\ if\ students\ are\ extremely\ interested\ in\ major\ k \end{cases}$$

$$where, \quad k = \begin{cases} 1\ for\ Economics\ major \\ 2\ for\ Business\ major \\ 3 \text{ for Environmental major} \\ 4\ for\ Agriculture\ major \end{cases}$$

SECTION 5

PROBIT RESULTS AND ANALYSIS

5.1 Probit Estimates

Using the survey data and maximum likelihood procedures, the probit model for each major was estimated. The parameter estimates for economics, business, environment, and agriculture major, reported in Table 5.1-1, correspond to β_i coefficients in Equation 4-8 and represent factors affecting students' interest in a selected major. Marginal effects are shown in Table 5.1-2. The R^2 reveals what percentage of students' interests in a certain major is explained by the models.

Table 5.1-1 Probit Models Regression Coefficients

Variables	econ_int	busi_int	envir_int	agri_int
male	.452026* (.1276056)	.1603332 (.1186845)	.0756552 (.128736)	.3552942* (.1310824)
time_study	.0761782* (.0300611)	.039037 (.0291968)	-.0118772 (.0313342)	.0038691 (.0310018)
yearinh = 2(sophomore)	-.3795273* (.1775397)	-.0649327 (.1614149)	.0138906 (.1721166)	-.0393868 (.1757918)
3(junior)	.0248173 (.1776155)	.224096 (.1688201)	-.3024934 (.1898531)	-.1694335 (.1910715)
4(senior)	-.0335739 (.1774947)	.0840907 (.1675927)	-.408271* (.1829115)	-.2597788 (.1873238)
GPA= **1**(GPA<2.0)	-.9221712** (.5018258)	-.8999927* (.3581584)	.5324445 (.3735179)	-.1470717 (.3908527)
2(GPA 2.0-2.49)	.2733766 (.2141493)	-.2328174 (.2008853)	.3399431 (.2196069)	.3383462 (.2233445)
3(GPA 2.5-2.99)	.0643215 (.1824765)	-.2263724 (.1686683)	.3629687* (.1821914)	.402064* (.1865988)
4(GPA 3.0-3.49)	.0940391 (.1668746)	-.0611547 (.1541786)	.0852285 (.1678969)	.0642399 (.1726498)
white	-.3693958* (.175414)	-.457358* (.1709558)	.3428403** (.1826706)	.6167865* (.1950185)
black	-.133984 (.2058839)	-.0298054 (.2010772)	.0459765 (.2178302)	.2627181 (.2313119)
Job_bus (parents' job related to business field)	.1241431 (.1630595)	.1590239 (.1547816)	N/A	N/A
Job_prof (parents'job related to professional field)	.2734993 (.2988227)	-.1326981 (.2968561)	N/A	N/A
Job_agri (parents' job related to agriculture field)	N/A	N/A	.5722536* (.1833411)	.6524606* (.1869479)
Fouryr (students have 4 year college plan after high school)	.2124474 (.1374524)	.2352773** (.1275917)	.0200773 (.1394315)	-.0373582 (.1428427)
sch_envir_class (school offers environmental classes)	N/A	N/A	.387115* (.1570172)	N/A
sch_envir_club (school has environmental club)	N/A	N/A	-.2402414 (.15087)	N/A
sch_agri_class (school offers agriculture classes)	N/A	N/A	N/A	.3959563* (.1874971)
sch_agri_club (school has environmental club)	N/A	N/A	N/A	-.0381823 (.1689255)

*statistically significant at 5%, **statistically significant at 10%

Table5.1-2 Probit Models Marginal Effects Coefficients

Variables	econ_int	busi_int	envir_int	agri_int
male	.1392603*	.0600828	.0278068	.1235345*
	(.0381307)	(.0442246)	(.0472669)	(.0444951)
time_study	.023469*	.0146286	-.0043654	.0013453
	(.0091014)	(.0108863)	(.0115128)	(.0107788)
yearinh = 2(sophomore)	-.1108451*	-.0245282	.0052647	-.0140402
	(.051574)	(.0609295)	(.065222)	(.0626814)
3(junior)	.0081487	.0836251	-.112971	-.0597012
	(.0583194)	(.0627562)	(.070442)	(.0673168)
4(senior)	-.0108674	.0316638	-.1507359*	-.0905611
	(.0574515)	(.0630515)	(.0669705)	(.0651635)
GPA= 1(GPA<2.0)	-.1897561*	-.3267017*	.1979098	-.0485335
	(.0686176)	(.1142713)	(.13774)	(.1258819)
2(GPA 2.0-2.49)	.0884348	-.0882608	.1256673	.1201189
	(.0701732)	(.0762934)	(.0813301)	(.0798065)
3(GPA 2.5-2.99)	.0196753	-.085798	.1343456*	.1434095*
	(.0557857)	(.0638032)	(.0668138)	(.0662055)
4(GPA 3.0-3.49)	.0290169	-.0229438	.0307498	.0220599
	(.0512737)	(.0578071)	(.0604822)	(.0592341)
white	-.1138036*	-.1713891*	.1260096**	.2144544*
	(.0533785)	(.0626857)	(.0663273)	(.0657394)
black	-.0412778	-.0111692*	.0168985	.0913461
	(.063359)	(.0753454)	(.0800482)	(.0801599)
Job_bus (parents' job related to business field)	.038246	.0595922	N/A	N/A
	(.050161)	(.0578158)		
Job_prof (parents'job related to professional field)	.0842598	-.0497269	N/A	N/A
	(.091825)	(.1111816)		
Job_agri (parents' job related to agriculture field)	N/A	N/A	.2103295*	.2268581*
			(.0650844)	(.0623454)
Fouryr (students have 4 year college plan after high school)	.0654509	.0881672*	.0073793	-.0129893
	(.0421308)	(.0473259)	(.0512455)	(.0496549)
sch_envir_class (school offers environmental classes)	N/A	N/A	.1422826*	N/A
			(.0565236)	
sch_envir_club (school has environmental club)	N/A	N/A	-.0882998	N/A
			(.0549895)	
sch_agri_class (school offers agriculture classes)	N/A	N/A	N/A	.1376725*
				(.0643703)
sch_agri_club (school has environmental club)	N/A	N/A	N/A	-.0132759
				(.0587277)

*statistically significant at 5%, **statistically significant at 10%

5.1.1 Probit Regression for Economics

In Appendix Table 1, the estimates show that several demographic factors have a statistically significant relationship with interest in Economics major.

Sophomores surveyed were significantly less likely to be interested in studying economics than freshmen. Students who study more also show greater interest in economics. While than others, white high school students are less interested in studying economics. In contrast, male high school students are significantly more interested in studying economics than female students.

These coefficients are converted into marginal effects, and the differences are illustrated in Figure 5. White high school students, are 12% less likely than the base group of high school students to be interested in Economics major. Male students are 12% more likely to be interested in Economics than female students.

In order to understand influence of the predicted probability of interested in Economics major time spent studying in one hour increments from 1 to 11 is calculated. Results are shown in Appendix Table 2 that includes average predicted probabilities calculated using the sample values of other predictor variables.

The mean predicted probability of interested in economics is only 0.23 if a student only spends an hour per week studying and increases to 0.49 if a student spends 11 hours per week. (averaging across the sample values of all other variables)

5.1.2 Probit Regression for Business

In Table 3, the indicator variable for a GPA of 1 is statistically significant, indicating that high school students with GPA below 2.0 are significantly less likely than

high GPA students (GPA>3.5) to be interested in majoring in business. Students with 4 year college plans have higher probability of interest in business than students who plan to attend a 2 year school after high school, at the 10% level of significant.

As shown in Figure 6, it shows that other races of high school students nonwhite and non-African American have 19% higher probability of interested in business than white students.

5.1.3 Probit Regression for Environment

As shown in Table 4, students attending high schools offering environmental classes are 32% more likely to be interested in an environmental major than student at high school that do not offer such classes.

Even though the overall effect of GPA is not significant, but (GPA 2.0-2.49) is statistically significant, as are year in high school and parents' having a job in agriculture. The marginal effects are shown in Table 5. Compared to students who are not white or African American, white students are 12.6% more likely to be interested in an environmental major. Further, students whose parents' jobs are related to agriculture are 21% more likely to be interested in environmental major. Juniors are 15% likely to be interested in an environmental major compared to senior students. In Table 6, the predicted probability of interest in the environmental major is 0.57 for the students who have low GPA (<2.0), and only 0.36 for the students who have highest GPA (>3.5). Thus, high school students who have higher GPA tend to be less interested in environmental major.

5.1.4 Probit Regression for Agriculture

We can see from Table 7, male, white, parents' job in agriculture, and being at a school that offers agricultural classes are statistically significant. Thus, males are more likely to express interest in agriculture than females, whites are more likely to be interested in agriculture than other races, students whose parents are employed in agriculture are more likely to be interested than those with other employment backgrounds, and students whose high schools offer agriculture classes are more likely to express interest in agriculture than those students with no agriculture classes provided in their schools.

For a better understanding, the average marginal effects output are shown in Table 8. Compared to female, male students are 12.4% more likely to be interested in agriculture major, as shown in Figure 8 white students are also more likely to interested in agriculture major with a higher probability 21%. In Figure 9, there also shows that more white students are interested in agriculture major in our organized data. Students with parents whose jobs are involved with agriculture are 23% more likely to be interested in an agriculture major, and students whose high schools offer agriculture classes are 14% more likely to be interested in agriculture as shown in Figure 10.

SECTION 6

ORDERED PROBIT RESULTS AND ANALYSIS

6.1 Ordered Probit Parameter Estimates

Parameter estimates for each major's ordered probit model are shown in the following Table 6.1-1. Numerous explanatory variables have a statistically significant impact on the strength of interest in each selected major. The tables also reveal that the impact of several of these factors varies by different major.

Table 6.1-1 Ordered Probit Model Regression Coefficients

Variables	econ	busi	envir	agri
male	.4146022* (.1046477)	.1484423 (.0987704)	.1834568** (.109265)	.3363341* (.1125399)
time_study	.0471469** (.0249493)	.0415253** (.0241311)	-.0031998 (.0267775)	.0048774 (.02616)
yearinh = 2(sophomore)	-.2180981 (.1434076)	-.142959 (.135063)	-.0400595 (.1466201)	-.0146607 (.1506259)
3(junior)	-.0208524 (.1477775)	.2165751 (.1404948)	-.1876967 (.1632339)	-.0580653 (.1643716)
4(senior)	-.1865581 (.1485595)	.0402762 (.139828)	-.2974959** (.1555245)	-.2220184 (.160087)
GPA= **1**(GPA<2.0)	-.9256098* (.3343268)	-.502642** (.2905053)	.3233114 (.3329544)	-.1093438 (.3404273)
2(GPA 2.0-2.49)	.2342981 (.1780159)	-.0399761 (.1697534)	.3397121** (.1858497)	.3657897** (.1888272)
3(GPA 2.5-2.99)	.0263067 (.1479094)	-.1194641 (.1402251)	.4084879* (.1550113)	.351333* (.1585374)
4(GPA 3.0-3.49)	.0009008 (.1353704)	.0364445 (.1272883)	.1477521 (.1427073)	.0123191 (.1488809)
white	-.2218743 (.148078)	-.3455706* (.1398536)	.2174008 (.1553578)	.5533211* (.1659608)
black	.1739936 (.1720906)	.0866079 (.1634388)	.0220554 (.1851234)	.2473487 (.1967871)
Job_bus (parents' job related to business field)	.0185055 (.1340018)	.1540904 (.1270823)	N/A	N/A
Job_prof (parents'job related to professional field)	.3294076 (.2555953)	.1404812 (.2489518)	N/A	N/A
Job_agri (parents' job related to agriculture field)	N/A	N/A	.569909* (.1523635)	.5936109* (.1554753)
Fouryr (students have 4 year college plan after high school)	.0570699 (.1137783)	.2350507* (.1075086)	.0153869 (.1191185)	-.1166692 (.1223124)
sch_envir_class (school offers environmental classes)	N/A	N/A	.313669* (.1314204)	N/A
sch_envir_club (school has environmental club)	N/A	N/A	-.233672** (.1265774)	N/A
sch_agri_class (school offers agriculture classes)	N/A	N/A	N/A	.2492974 (.1581232)
sch_agri_club (school has environmental club)	N/A	N/A	N/A	-.005318 (.143718)

*__statistically__ significant at 5%, **statistically significant at 10%

6.1.1 Ordered Probit Regression for Economics

As shown in Table 9, only male and GPA of less than 2.0 are statistically significant. Male students are 15% less likely to report no interest in economics major but 2.9 percentage points more likely to report being extremely interested in economics as a major, as shown in Table 10 and 11. Compared to students with a GPA between 3.5 and 4.0, students with a GPA less than 2.0 are 2.8 percentage points less likely to report extremely interested in economics major.

Thus, in Figure 11, we have an overview of marginal effects of the statistically significant variables in the strength of interested in Economics major.

6.1.2 Ordered Probit Regression for Business

In the output Table 12, both white and Fouryr are statistically significant, meanwhile time_study and GPA of 1 are statistically significant at 10% level of interval. In order to understand the model better, we have the marginal effects and easier to understand the coefficients in Table 13.

The predicted probability of being in the middle category of business (business of 3, moderately interested in business major) is -0.018 if students are white, or comparing to other races, white high school students are 1.8 percentage points less likely to report moderately interested in business major. High school students who have plans of 4 year of college study after high school are 1.2% more likely to report moderately interested in business. To some degree, each hour of study increases of chance of reporting moderately interest in business by 0.2 percentage points.

The explanation of each category of business would be the same based on the middle category of business interest as we have shown above. Thus, for the strength of interested in business on the scale of 1 to 5, we have an overview of the predicted probability of the statistically significant variables in Figure 12.

6.1.3 Ordered Probit Regression for Environment

In the Table 14 of output, GPA of 3, sch_envir_class, and Job_agri are statistically significant. Besides, male, yearinh of 4, GPA of 2, and sch_envir_club are statistically significant at 10% interval.

For a better of understanding these coefficients, we have marginal effects in Table 15.We could see them easier that male are 6.4 percentage points less likely to report not at all interested in an environment major. Compared to the highest GPA students, GPA of 2 and 3 categories students are 12 and 14 percentage points less likely to report not at all interested in an environment major. Students with parents whose job are involved with agriculture are 20 percentage points less likely to report not at all interested in an environmental major. Students whose high schools offer environmental classes are percentage points less likely to report not at all interested in an environmental major, but students whose high schools have environmental clubs are 8.1 more likely to report not at all interested in an environmental major.

For a better of understanding, we can also see the marginal effects of these statistically significant variables in higher category of environment interest (envir =4, very interested) in Table 16. As we can see that, males are 2.5 percentage points more likely to report very interested in an environment major. Compared to highest GPA

students (GPA > 3.5) middle class GPA students (GPA of 2 and 3) are 4.7 and 5.7 percentage points more likely to report very interested in an environment major. Students with parents whose jobs are involved with agriculture are 7.9 percentage points more likely to report very interested in an environmental major. Students whose high schools offer environmental classes are 4.3 percentage points more likely to report very interested in an environmental major, and students whose high schools have environmental clubs are 3.2 percentage points less likely to report very interested in environmental club. Thus, high schools that have environmental clubs have a negative effect. May be some activities of the environmental clubs involved with hard physical works make students feel less interested in this area.

Thus, for the strength of interested in environmental major on the scale of 1 to 5, we have an overview of the marginal effects of the statistically significant variables in Figure 13.

6.1.4 Ordered Probit Regression for Agriculture

In the output, Table 17, both male, GPA of 3, white, and job_agri are statistically significant in this model. Meanwhile, GPA of 2 is statistically significant at 10% level of interval. For an easier understanding of their coefficients, we have marginal effects to show the predicted probability for each of the values of the statistically significant variables specified in Table 18.

As we can see, the predicted probability of being in the lowest category of agri(not at all interested in agriculture) is -0.12 if high students are male. In other words, males are 12 percentage points less likely to report not at all interested in an agriculture

major. High school students whose parents' jobs are related with the field of agriculture are both 21 percentage points less likely to report not at all interested in an agriculture major. White students versus other races are 20 percentage points less likely to report not at all interested in an agriculture major. Students at GPA levels of 2.0-2.49 and 2.5-3.0 are 13 percentage points less likely to report not at all interested in an agriculture major.

For the higher category of agri, we can see from the Table 19, males are 3.7 percentage points more likely to report very interested in an agriculture major. Students whose parents' jobs related to agriculture field are 6.5 percentage points more likely to report very interested in an agriculture major. White students versus other races are 6.1 percentage points more likely to report very interested in an agriculture major. Students at GPA levels of 2.0-2.49 and 2.5-3.0 are both 4 percentage points more likely to report very interested in an agriculture major.

Thus, for the ordered probit model of the strength of interested in agriculture on the scale of 1 to 5, we have an overview of the marginal effects of the statistically significant variables in Figure 14.

SECTION 7

SUMMARY AND CONCLUSIONS

The purpose of this study is to provide information about factors influencing the probability of high school students' interest in selected college majors and factors positively correlated with students' interest in a certain major. Results can assist college recruiters in identifying high school students most likely to enroll in certain majors, improving efficiency of recruitment efforts.

In order to achieve these objectives, a probit model and an ordered probit model for each of the four majors were estimated. Subsequently, predicted probabilities of explanatory variables were calculated in showing the change of students' interest in a selected major.

Using maximum likelihood procedures, probit model parameter estimates revealed several variables significantly affecting high students' interests in a selected major.

For economics major, several demographic factors have a statistically significant impact on the interest in Economics major. Increased time that students spent on study will increase their interest in economics major. White are less interested in both business and economics majors compared to other races, and female students versus male students are less interested in economics as well. Business major is more attracted to students who are in the middle class level of GPA, compared with other students. Agriculture/ environmental classes and agriculture /environmental club have the potential to attract students get more interested in agriculture or environment major. Meanwhile, parents'

job which are related with agriculture field have a significant influence on high school students' interest in agriculture and environment majors. More white students are interested in agriculture major compared to other races.

Parameter estimates from the ordered probit model for each major revealed significant reason for preferred major as well as demographic, parents' job, and extracurricular variables. It turned out that basically, students who are in the lowest level of GPA showed negative in all levels of interest among four majors, and male students were more positive in all levels of interest among four majors. For business major, students who might have future plan of four year college after high school study were increase their probability in interested in this major. To some degree, students who spent more time study exhibited high probability of interested in business. The same reason showed that students who have the experience of agriculture/environmental classes or club showed the highest probabilities of interested in agriculture and environment majors. Parents' jobs that are related to agriculture field showed positive effect in all level of interest among four majors.

Based on this thesis, probit models and ordered probit models were built to analyze preferred college majors and strength of interest for high school students. Specifically, marginal effects of several statistically significant variables were calculated in order to illustrate the effects of those variables on the strength of interest for the four majors. The findings of this research provide an improved understanding of how to deal with the employment shortage in the agribusiness and environmental and nature resources fields. Offering opportunity for students to get involved in those areas both in

academics and extracurricular activities, cultivating their interests, then target those students with pertinent information about college and employment opportunities in those fields.

APPENDICES

Appendix A

TABLES

Table 1. Economics Major Probit Analysis Results

Probit regression — Number of obs = 507
LR chi2(14) = 40.38
Prob > chi2 = 0.0002
Log likelihood = -275.63406 — Pseudo R2 = 0.0682

econ_int	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.452026	.1276056	3.54	0.000	.2019236	.7021284
time_study	.0761782	.0300611	2.53	0.011	.0172595	.1350969
yearinh						
2	-.3795273	.1775397	-2.14	0.033	-.7274987	-.0315559
3	.0248173	.1776155	0.14	0.889	-.3233028	.3729373
4	-.0335739	.1774947	-0.19	0.850	-.381457	.3143093
GPA						
1	-.9221712	.5018258	-1.84	0.066	-1.905732	.0613892
2	.2733766	.2141493	1.28	0.202	-.1463483	.6931015
3	.0643215	.1824765	0.35	0.724	-.2933259	.4219689
4	.0940391	.1668746	0.56	0.573	-.233029	.4211072
white	-.3693958	.175414	-2.11	0.035	-.7132009	-.0255908
black	-.133984	.2058839	-0.65	0.515	-.5375091	.2695411
Job_bus	.1241431	.1630595	0.76	0.446	-.1954477	.4437338
Job_prof	.2734993	.2988227	0.92	0.360	-.3121825	.8591811
Fouryr	.2124474	.1374524	1.55	0.122	-.0569544	.4818492
_cons	-.9255231	.2798017	-3.31	0.001	-1.473924	-.3771219

Table 2. Marginal Effect of time_study in Probit Model- Economics

```
. margins, at( time_study=(1 (1) 11)) vsquish

Predictive margins                                Number of obs   =        507
Model VCE    : OIM

Expression   : Pr(econ_int), predict()
1._at        : time_study      =           1
2._at        : time_study      =           2
3._at        : time_study      =           3
4._at        : time_study      =           4
5._at        : time_study      =           5
6._at        : time_study      =           6
7._at        : time_study      =           7
8._at        : time_study      =           8
9._at        : time_study      =           9
10._at       : time_study      =          10
11._at       : time_study      =          11
```

	Delta-method Margin	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_at						
1	.2279811	.0239258	9.53	0.000	.1810874	.2748748
2	.2502369	.0201616	12.41	0.000	.2107209	.2897528
3	.2735876	.0193402	14.15	0.000	.2356816	.3114937
4	.2979611	.0228178	13.06	0.000	.253239	.3426832
5	.3232711	.0298079	10.85	0.000	.2648487	.3816936
6	.3494185	.0388959	8.98	0.000	.2731839	.4256532
7	.3762923	.0491804	7.65	0.000	.2799005	.4726841
8	.4037708	.0601458	6.71	0.000	.2858872	.5216544
9	.4317235	.0714508	6.04	0.000	.2916826	.5717644
10	.460013	.0828299	5.55	0.000	.2976694	.6223566
11	.4884967	.0940546	5.19	0.000	.3041531	.6728402

Table 3. Business Major Probit Analysis Results

```
Iteration 0:   log likelihood = -350.07432
Iteration 1:   log likelihood = -331.69681
Iteration 2:   log likelihood = -331.63034
Iteration 3:   log likelihood = -331.63034

Probit regression                                 Number of obs   =        507
                                                  LR chi2(14)     =      36.89
                                                  Prob > chi2     =     0.0008
Log likelihood = -331.63034                       Pseudo R2       =     0.0527
```

busi_int	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.1603332	.1186845	1.35	0.177	-.0722842	.3929505
time_study	.039037	.0291968	1.34	0.181	-.0181877	.0962617
yearinh						
2	-.0649327	.1614149	-0.40	0.687	-.3813002	.2514347
3	.224096	.1688201	1.33	0.184	-.1067852	.5549773
4	.0840907	.1675927	0.50	0.616	-.244385	.4125664
GPA						
1	-.8999927	.3581584	-2.51	0.012	-1.60197	-.1980152
2	-.2328174	.2008853	-1.16	0.246	-.6265453	.1609105
3	-.2263724	.1686683	-1.34	0.180	-.5569562	.1042114
4	-.0611547	.1541786	-0.40	0.692	-.3633392	.2410298
white	-.457358	.1709558	-2.68	0.007	-.7924251	-.1222908
black	-.0298054	.2010772	-0.15	0.882	-.4239094	.3642987
Job_bus	.1590239	.1547816	1.03	0.304	-.1443424	.4623903
Job_prof	-.1326981	.2968561	-0.45	0.655	-.7145254	.4491291
Fouryr	.2352773	.1275917	1.84	0.065	-.0147978	.4853524
_cons	.1417382	.2627859	0.54	0.590	-.3733127	.6567891

Table 4. Environment Major Probit Analysis Results

Probit regression — Number of obs = 436
LR chi2(15) = 37.18
Prob > chi2 = 0.0012
Log likelihood = -280.01556 — Pseudo R2 = 0.0623

envir_int	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.0756552	.128736	0.59	0.557	-.1766627	.3279731
time_study	-.0118772	.0313342	-0.38	0.705	-.0732911	.0495367
yearinh						
2	.0138906	.1721166	0.08	0.936	-.3234518	.351233
3	-.3024934	.1898531	-1.59	0.111	-.6745986	.0696119
4	-.408271	.1829115	-2.23	0.026	-.7667709	-.0497711
GPA						
1	.5324445	.3735179	1.43	0.154	-.1996372	1.264526
2	.3399431	.2196069	1.55	0.122	-.0904785	.7703648
3	.3629687	.1821914	1.99	0.046	.0058802	.7200572
4	.0852285	.1678969	0.51	0.612	-.2438435	.4143004
white	.3428403	.1826706	1.88	0.061	-.0151874	.700868
black	.0459765	.2178302	0.21	0.833	-.3809628	.4729159
Job_agri	.5722536	.1833411	3.12	0.002	.2129117	.9315955
Fouryr	.0200773	.1394315	0.14	0.886	-.2532033	.2933579
sch_envir_class	.387115	.1570172	2.47	0.014	.0793669	.6948631
sch_envir_club	-.2402414	.15087	-1.59	0.111	-.5359411	.0554584
_cons	-.6371151	.3018013	-2.11	0.035	-1.228635	-.0455954

Table 5. Marginal Effects of Probit Model- Environment

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.0278068	.0472669	0.59	0.556	-.0648347	.1204482
time_study	-.0043654	.0115128	-0.38	0.705	-.0269302	.0181993
yearinh						
2	.0052647	.065222	0.08	0.936	-.122568	.1330973
3	-.112971	.070442	-1.60	0.109	-.2510348	.0250927
4	-.1507359	.0669705	-2.25	0.024	-.2819955	-.0194762
GPA						
1	.1979098	.13774	1.44	0.151	-.0720557	.4678752
2	.1256673	.0813301	1.55	0.122	-.0337369	.2850714
3	.1343456	.0668138	2.01	0.044	.003393	.2652982
4	.0307498	.0604822	0.51	0.611	-.0877932	.1492928
white	.1260096	.0663273	1.90	0.057	-.0039895	.2560087
black	.0168985	.0800482	0.21	0.833	-.1399931	.17379
Job_agri	.2103295	.0650844	3.23	0.001	.0827665	.3378926
Fouryr	.0073793	.0512455	0.14	0.886	-.0930599	.1078186
sch_envir_class	.1422826	.0565236	2.52	0.012	.0314984	.2530668
sch_envir_club	-.0882998	.0549895	-1.61	0.108	-.1960773	.0194778

Note: dy/dx for factor levels is the discrete change from the base level.

Table 6. GPA Marginal Effect of Probit Model- Environment

```
. margins GPA, atmeans

Adjusted predictions                              Number of obs   =        436
Model VCE    : OIM

Expression   : Pr(envir_int), predict()
at           : male            =     .5022936 (mean)
               time_study      =     2.793578 (mean)
               1.yearinh       =     .2545872 (mean)
               2.yearinh       =     .2683486 (mean)
               3.yearinh       =     .2201835 (mean)
               4.yearinh       =     .2568807 (mean)
               1.GPA           =     .0321101 (mean)
               2.GPA           =     .1330275 (mean)
               3.GPA           =          .25 (mean)
               4.GPA           =     .3050459 (mean)
               5.GPA           =     .2798165 (mean)
               white           =     .6559633 (mean)
               black           =     .1949541 (mean)
               Job_agri        =     .1399083 (mean)
               Fouryr          =     .5114679 (mean)
               sch_envir_~s    =     .6307339 (mean)
               sch_envir_~b    =     .4862385 (mean)
```

	Delta-method					
	Margin	Std. Err.	z	P>|z|	[95% Conf.	Interval]
GPA						
1	.5729678	.1355266	4.23	0.000	.3073405	.8385951
2	.4965826	.0694922	7.15	0.000	.3603803	.6327848
3	.5057682	.0503219	10.05	0.000	.4071391	.6043973
4	.396167	.0436347	9.08	0.000	.3106446	.4816895
5	.3637288	.0466931	7.79	0.000	.2722121	.4552455

Table 7. Agriculture Major Probit Analysis Results

Probit regression — Number of obs = 440
LR chi2(15) = 58.41
Prob > chi2 = 0.0000
Log likelihood = -268.09273 — Pseudo R2 = 0.0982

agri_int	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.3552942	.1310824	2.71	0.007	.0983773	.6122111
time_study	.0038691	.0310018	0.12	0.901	-.0568932	.0646315
yearinh						
2	-.0393868	.1757918	-0.22	0.823	-.3839324	.3051588
3	-.1694335	.1910715	-0.89	0.375	-.5439268	.2050599
4	-.2597788	.1873238	-1.39	0.166	-.6269268	.1073692
GPA						
1	-.1470717	.3908527	-0.38	0.707	-.913129	.6189855
2	.3383462	.2233445	1.51	0.130	-.0994009	.7760934
3	.402064	.1865988	2.15	0.031	.0363371	.7677909
4	.0642399	.1726498	0.37	0.710	-.2741475	.4026272
white	.6167865	.1950185	3.16	0.002	.2345573	.9990158
black	.2627181	.2313119	1.14	0.256	-.190645	.7160811
Job_agri	.6524606	.1869479	3.49	0.000	.2860494	1.018872
Fouryr	-.0373582	.1428427	-0.26	0.794	-.3173247	.2426083
sch_agri_class	.3959563	.1874971	2.11	0.035	.0284688	.7634438
sch_agri_club	-.0381823	.1689255	-0.23	0.821	-.3692702	.2929056
_cons	-1.303201	.3331486	-3.91	0.000	-1.95616	-.6502413

Table 8. Marginal Effects of Probit Model- Agriculture

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.1235345	.0444951	2.78	0.005	.0363256	.2107433
time_study	.0013453	.0107788	0.12	0.901	-.0197808	.0224714
yearinh						
2	-.0140402	.0626814	-0.22	0.823	-.1368935	.1088131
3	-.0597012	.0673168	-0.89	0.375	-.1916397	.0722374
4	-.0905611	.0651635	-1.39	0.165	-.2182792	.0371569
GPA						
1	-.0485335	.1258819	-0.39	0.700	-.2952574	.1981905
2	.1201189	.0798065	1.51	0.132	-.036299	.2765368
3	.1434095	.0662055	2.17	0.030	.0136492	.2731699
4	.0220599	.0592341	0.37	0.710	-.0940367	.1381565
white	.2144544	.0657394	3.26	0.001	.0856076	.3433012
black	.0913461	.0801599	1.14	0.254	-.0657644	.2484566
Job_agri	.2268581	.0623454	3.64	0.000	.1046634	.3490528
Fouryr	-.0129893	.0496549	-0.26	0.794	-.1103112	.0843326
sch_agri_class	.1376725	.0643703	2.14	0.032	.011509	.263836
sch_agri_club	-.0132759	.0587277	-0.23	0.821	-.1283801	.1018284

Note: dy/dx for factor levels is the discrete change from the base level.

Table 9. Ordered Probit Analysis Results for Economics Major

Ordered probit regression — Number of obs = 485
LR chi2(14) = 43.78
Prob > chi2 = 0.0001
Log likelihood = -621.02055 — Pseudo R2 = 0.0340

econ	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.4146022	.1046477	3.96	0.000	.2094965	.6197079
time_study	.0471469	.0249493	1.89	0.059	-.0017529	.0960467
yearinh						
2	-.2180981	.1434076	-1.52	0.128	-.4991717	.0629756
3	-.0208524	.1477775	-0.14	0.888	-.310491	.2687862
4	-.1865581	.1485595	-1.26	0.209	-.4777294	.1046133
GPA						
1	-.9256098	.3343268	-2.77	0.006	-1.580878	-.2703414
2	.2342981	.1780159	1.32	0.188	-.1146066	.5832027
3	.0263067	.1479094	0.18	0.859	-.2635905	.3162038
4	.0009008	.1353704	0.01	0.995	-.2644204	.266222
white	-.2218743	.148078	-1.50	0.134	-.5121018	.0683532
black	.1739936	.1720906	1.01	0.312	-.1632979	.5112851
Job_bus	.0185055	.1340018	0.14	0.890	-.2441331	.2811442
Job_prof	.3294076	.2555953	1.29	0.197	-.17155	.8303651
Fouryr	.0570699	.1137783	0.50	0.616	-.1659314	.2800712
/cut1	-.022178	.2320696			-.4770261	.4326701
/cut2	.7816782	.2341952			.3226641	1.240692
/cut3	1.53352	.2399845			1.063159	2.003881
/cut4	2.11349	.2535038			1.616632	2.610348

Table 10. Marginal Effects of Ordered Probit Model- Economics at outcome (1)

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	-.1536368	.0373826	-4.11	0.000	-.2269054	-.0803682
time_study	-.017471	.0091742	-1.90	0.057	-.0354521	.0005102
yearinh						
2	.0809026	.0529126	1.53	0.126	-.0228043	.1846094
3	.0075782	.0537096	0.14	0.888	-.0976908	.1128472
4	.0690306	.0548223	1.26	0.208	-.0384191	.1764804
GPA						
1	.3315592	.1024819	3.24	0.001	.1306983	.53242
2	-.0855156	.0640905	-1.33	0.182	-.2111306	.0400994
3	-.0098568	.0554288	-0.18	0.859	-.1184952	.0987816
4	-.0003383	.0508402	-0.01	0.995	-.0999833	.0993066
white	.0822187	.0545888	1.51	0.132	-.0247734	.1892109
black	-.0644758	.0636602	-1.01	0.311	-.1892476	.0602959
Job_bus	-.0068575	.0496547	-0.14	0.890	-.1041789	.0904639
Job_prof	-.1220667	.0943759	-1.29	0.196	-.3070401	.0629067
Fouryr	-.0211481	.0421399	-0.50	0.616	-.1037408	.0614446

Note: dy/dx for factor levels is the discrete change from the base level.

Table 11. Marginal Effects of Ordered Probit Model- Economics at outcome (5)

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.0289768	.0093799	3.09	0.002	.0105925	.0473611
time_study	.0032951	.0018714	1.76	0.078	-.0003728	.006963
yearinh						
2	-.0152198	.0105921	-1.44	0.151	-.03598	.0055403
3	-.001715	.0121533	-0.14	0.888	-.025535	.0221049
4	-.0133661	.0110574	-1.21	0.227	-.0350382	.0083059
GPA						
1	-.0284416	.0097228	-2.93	0.003	-.047498	-.0093852
2	.0195007	.0163142	1.20	0.232	-.0124745	.051476
3	.0018234	.0102564	0.18	0.859	-.0182788	.0219255
4	.000061	.0091725	0.01	0.995	-.0179167	.0180388
white	-.0155069	.0107994	-1.44	0.151	-.0366733	.0056594
black	.0121605	.012335	0.99	0.324	-.0120156	.0363367
Job_bus	.0012934	.0093734	0.14	0.890	-.0170781	.0196649
Job_prof	.0230225	.018434	1.25	0.212	-.0131075	.0591525
Fouryr	.0039887	.0079858	0.50	0.617	-.0116632	.0196405

Table 12. Ordered Probit Analysis Results for Business Major

Ordered probit regression — Number of obs = 497
LR chi2(14) = 42.34
Prob > chi2 = 0.0001
Log likelihood = -759.48783 — Pseudo R2 = 0.0271

business	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.1484423	.0987704	1.50	0.133	-.0451442	.3420288
time_study	.0415253	.0241311	1.72	0.085	-.0057708	.0888214
yearinh						
2	-.142959	.135063	-1.06	0.290	-.4076777	.1217597
3	.2165751	.1404948	1.54	0.123	-.0587898	.4919399
4	.0402762	.139828	0.29	0.773	-.2337816	.314334
GPA						
1	-.5026423	.2905053	-1.73	0.084	-1.072022	.0667377
2	-.0399761	.1697534	-0.24	0.814	-.3726866	.2927344
3	-.1194641	.1402251	-0.85	0.394	-.3943002	.155372
4	.0364445	.1272883	0.29	0.775	-.213036	.2859249
white	-.3455706	.1398536	-2.47	0.013	-.6196785	-.0714626
black	.0866079	.1634388	0.53	0.596	-.2337263	.406942
Job_bus	.1540904	.1270823	1.21	0.225	-.0949863	.4031672
Job_prof	.1404812	.2489518	0.56	0.573	-.3474553	.6284177
Fouryr	.2350507	.1075086	2.19	0.029	.0243378	.4457636
/cut1	-.6180715	.2222989			-1.053769	-.1823736
/cut2	-.0014656	.2208077			-.4342408	.4313095
/cut3	.7082039	.221771			.2735407	1.142867
/cut4	1.434772	.2279431			.9880115	1.881532

Table 13. Marginal Effects of Ordered Probit Model- Business at outcome (3)

	Delta-method				
	dy/dx	Std. Err.	z	P>|z|	[95% Conf. Interval]
male	.0076935	.0053836	1.43	0.153	-.0028581 .0182452
time_study	.0021522	.001331	1.62	0.106	-.0004566 .0047609
yearinh					
2	-.0103889	.0099458	-1.04	0.296	-.0298824 .0091045
3	.0072589	.0058596	1.24	0.215	-.0042256 .0187435
4	.0021523	.0075012	0.29	0.774	-.0125497 .0168544
GPA					
1	-.0464744	.0362694	-1.28	0.200	-.1175611 .0246123
2	-.0019219	.0084518	-0.23	0.820	-.0184872 .0146434
3	-.0067746	.0082183	-0.82	0.410	-.0228821 .009333
4	.00144	.0051081	0.28	0.778	-.0085717 .0114517
white	-.0179104	.0082533	-2.17	0.030	-.0340866 -.0017343
black	.0044888	.0085335	0.53	0.599	-.0122366 .0212141
Job_bus	.0079863	.0068173	1.17	0.241	-.0053754 .0213479
Job_prof	.0072809	.0129831	0.56	0.575	-.0181656 .0327274
Fouryr	.0121823	.0061724	1.97	0.048	.0000847 .0242799

Note: dy/dx for factor levels is the discrete change from the base level.

Table 14. Ordered Probit Analysis Results for Environmental Major

Ordered probit regression — Number of obs = 423
LR chi2(15) = 40.68
Prob > chi2 = 0.0004
Log likelihood = -616.25737 — Pseudo R2 = 0.0320

envir	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.1834568	.109265	1.68	0.093	-.0306988	.3976123
time_study	-.0031998	.0267775	-0.12	0.905	-.0556828	.0492831
yearinh						
2	-.0400595	.1466201	-0.27	0.785	-.3274296	.2473105
3	-.1876967	.1632339	-1.15	0.250	-.5076294	.1322359
4	-.2974959	.1555245	-1.91	0.056	-.6023183	.0073266
GPA						
1	.3233114	.3329544	0.97	0.332	-.3292673	.97589
2	.3397121	.1858497	1.83	0.068	-.0245466	.7039707
3	.4084879	.1550113	2.64	0.008	.1046713	.7123046
4	.1477521	.1427073	1.04	0.301	-.1319492	.4274533
white	.2174008	.1553578	1.40	0.162	-.0870948	.5218965
black	.0220554	.1851234	0.12	0.905	-.3407797	.3848906
Job_agri	.569909	.1523635	3.74	0.000	.271282	.8685359
Fouryr	.0153869	.1191185	0.13	0.897	-.2180812	.2488549
sch_envir_class	.313669	.1314204	2.39	0.017	.0560898	.5712482
sch_envir_club	-.2336727	.1265774	-1.85	0.065	-.4817597	.0144144
/cut1	.0423878	.2621075			-.4713335	.556109
/cut2	.6071238	.2623487			.0929299	1.121318
/cut3	1.308135	.2664323			.7859371	1.830333
/cut4	1.972897	.2764145			1.431134	2.514659

Table 15. Marginal Effects of Ordered Probit Model- Environment at outcome (1)

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	-.0639014	.0378421	-1.69	0.091	-.1380706	.0102677
time_study	.0011146	.0093269	0.12	0.905	-.0171659	.019395
yearinh						
2	.0133851	.0489743	0.27	0.785	-.0826028	.109373
3	.0647961	.0564685	1.15	0.251	-.0458802	.1754724
4	.1047784	.0545561	1.92	0.055	-.0021497	.2117065
GPA						
1	-.1153154	.1127019	-1.02	0.306	-.336207	.1055763
2	-.1207676	.0645176	-1.87	0.061	-.2472197	.0056846
3	-.1431152	.0538713	-2.66	0.008	-.248701	-.0375293
4	-.0543238	.0525065	-1.03	0.301	-.1572346	.0485869
white	-.0757248	.0538856	-1.41	0.160	-.1813385	.029889
black	-.0076823	.0644775	-0.12	0.905	-.1340559	.1186913
Job_agri	-.19851	.0519955	-3.82	0.000	-.3004192	-.0966007
Fouryr	-.0053595	.0414905	-0.13	0.897	-.0866794	.0759604
sch_envir_class	-.1092568	.0452328	-2.42	0.016	-.1979114	-.0206022
sch_envir_club	.0813926	.043789	1.86	0.063	-.0044323	.1672175

Note: dy/dx for factor levels is the discrete change from the base level.

Table 16. Marginal Effects of Ordered Probit Model- Environment at outcome (4)

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.0253175	.0152444	1.66	0.097	-.0045609	.0551958
time_study	-.0004416	.0036949	-0.12	0.905	-.0076834	.0068002
yearinh						
2	-.0056634	.0207497	-0.27	0.785	-.046332	.0350052
3	-.0263603	.0230596	-1.14	0.253	-.0715562	.0188356
4	-.0412679	.0218883	-1.89	0.059	-.0841682	.0016325
GPA						
1	.04498	.0474521	0.95	0.343	-.0480245	.1379845
2	.0473233	.0264127	1.79	0.073	-.0044447	.0990913
3	.0571191	.0224709	2.54	0.011	.0130769	.1011613
4	.0200855	.0194936	1.03	0.303	-.0181213	.0582922
white	.0300018	.0215218	1.39	0.163	-.0121802	.0721838
black	.0030437	.0255452	0.12	0.905	-.0470239	.0531113
Job_agri	.0786487	.021694	3.63	0.000	.0361293	.1211682
Fouryr	.0021234	.0164438	0.13	0.897	-.0301059	.0343528
sch_envir_class	.043287	.0185278	2.34	0.019	.0069732	.0796008
sch_envir_club	-.0322474	.0176925	-1.82	0.068	-.066924	.0024293

Note: dy/dx for factor levels is the discrete change from the base level.

Table 17. Ordered Probit Analysis Results for Agriculture Major

Ordered probit regression — Number of obs = 429
LR chi2(15) = 66.08
Prob > chi2 = 0.0000
Log likelihood = -592.54974 — Pseudo R2 = 0.0528

agri	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.3363341	.1125399	2.99	0.003	.1157599	.5569084
time_study	.0048774	.02616	0.19	0.852	-.0463952	.05615
yearinh						
2	-.0146607	.1506259	-0.10	0.922	-.309882	.2805606
3	-.0580653	.1643716	-0.35	0.724	-.3802277	.2640971
4	-.2220184	.160087	-1.39	0.165	-.5357831	.0917462
GPA						
1	-.1093438	.3404273	-0.32	0.748	-.776569	.5578814
2	.3657897	.1888272	1.94	0.053	-.0043048	.7358841
3	.351333	.1585374	2.22	0.027	.0406054	.6620606
4	.0123191	.1488809	0.08	0.934	-.2794821	.3041203
white	.5533211	.1659608	3.33	0.001	.2280439	.8785983
black	.2473487	.1967871	1.26	0.209	-.1383469	.6330444
Job_agri	.5936109	.1554753	3.82	0.000	.2888849	.8983369
Fouryr	-.1166692	.1223124	-0.95	0.340	-.3563971	.1230586
sch_agri_class	.2492974	.1581232	1.58	0.115	-.0606184	.5592133
sch_agri_club	-.005318	.143718	-0.04	0.970	-.2870001	.2763642
/cut1	.6766938	.2849762			.1181507	1.235237
/cut2	1.098274	.2869438			.5358747	1.660674
/cut3	1.691632	.2915797			1.120147	2.263118
/cut4	2.250253	.2979765			1.66623	2.834277

Table 18. Marginal Effects of Ordered Probit Model- Agriculture at outcome (1)

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	-.1205007	.0394425	-3.06	0.002	-.1978065	-.0431948
time_study	-.0017475	.0093724	-0.19	0.852	-.0201171	.0166221
yearinh						
2	.0052091	.0535195	0.10	0.922	-.0996872	.1101055
3	.0207219	.0587135	0.35	0.724	-.0943544	.1357982
4	.0801724	.0577092	1.39	0.165	-.0329356	.1932803
GPA						
1	.0406469	.126411	0.32	0.748	-.2071142	.2884079
2	-.1321096	.0672759	-1.96	0.050	-.263968	-.0002512
3	-.1271193	.0572771	-2.22	0.026	-.2393803	-.0148583
4	-.0045739	.0552846	-0.08	0.934	-.1129297	.1037819
white	-.198242	.0576329	-3.44	0.001	-.3112005	-.0852836
black	-.0886193	.0701674	-1.26	0.207	-.2261449	.0489063
Job_agri	-.2126769	.0542063	-3.92	0.000	-.3189194	-.1064345
Fouryr	.0417999	.0437341	0.96	0.339	-.0439174	.1275172
sch_agri_class	-.0893174	.0563255	-1.59	0.113	-.1997134	.0210785
sch_agri_club	.0019053	.0514915	0.04	0.970	-.0990162	.1028268

Note: dy/dx for factor levels is the discrete change from the base level.

Table 19. Marginal Effects of Ordered Probit Model- Agriculture at outcome (4)

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
male	.0368482	.0127353	2.89	0.004	.0118875	.0618089
time_study	.0005344	.0028655	0.19	0.852	-.0050819	.0061507
yearinh						
2	-.001616	.0166053	-0.10	0.922	-.0341618	.0309299
3	-.0064122	.0181863	-0.35	0.724	-.0420567	.0292322
4	-.0244636	.0178651	-1.37	0.171	-.0594785	.0105513
GPA						
1	-.0121133	.0371508	-0.33	0.744	-.0849275	.0607009
2	.041566	.0218994	1.90	0.058	-.0013561	.084488
3	.0399678	.0187225	2.13	0.033	.0032724	.0766632
4	.0013893	.0167914	0.08	0.934	-.0315213	.0342999
white	.0606209	.0190247	3.19	0.001	.0233331	.0979087
black	.0270991	.0216716	1.25	0.211	-.0153765	.0695747
Job_agri	.065035	.0178839	3.64	0.000	.0299832	.1000869
Fouryr	-.0127821	.0134397	-0.95	0.342	-.0391235	.0135593
sch_agri_class	.0273126	.0175113	1.56	0.119	-.0070088	.061634
sch_agri_club	-.0005826	.0157448	-0.04	0.970	-.0314419	.0302767

Note: dy/dx for factor levels is the discrete change from the base level.

Appendix B

FIGURES

Figure 1

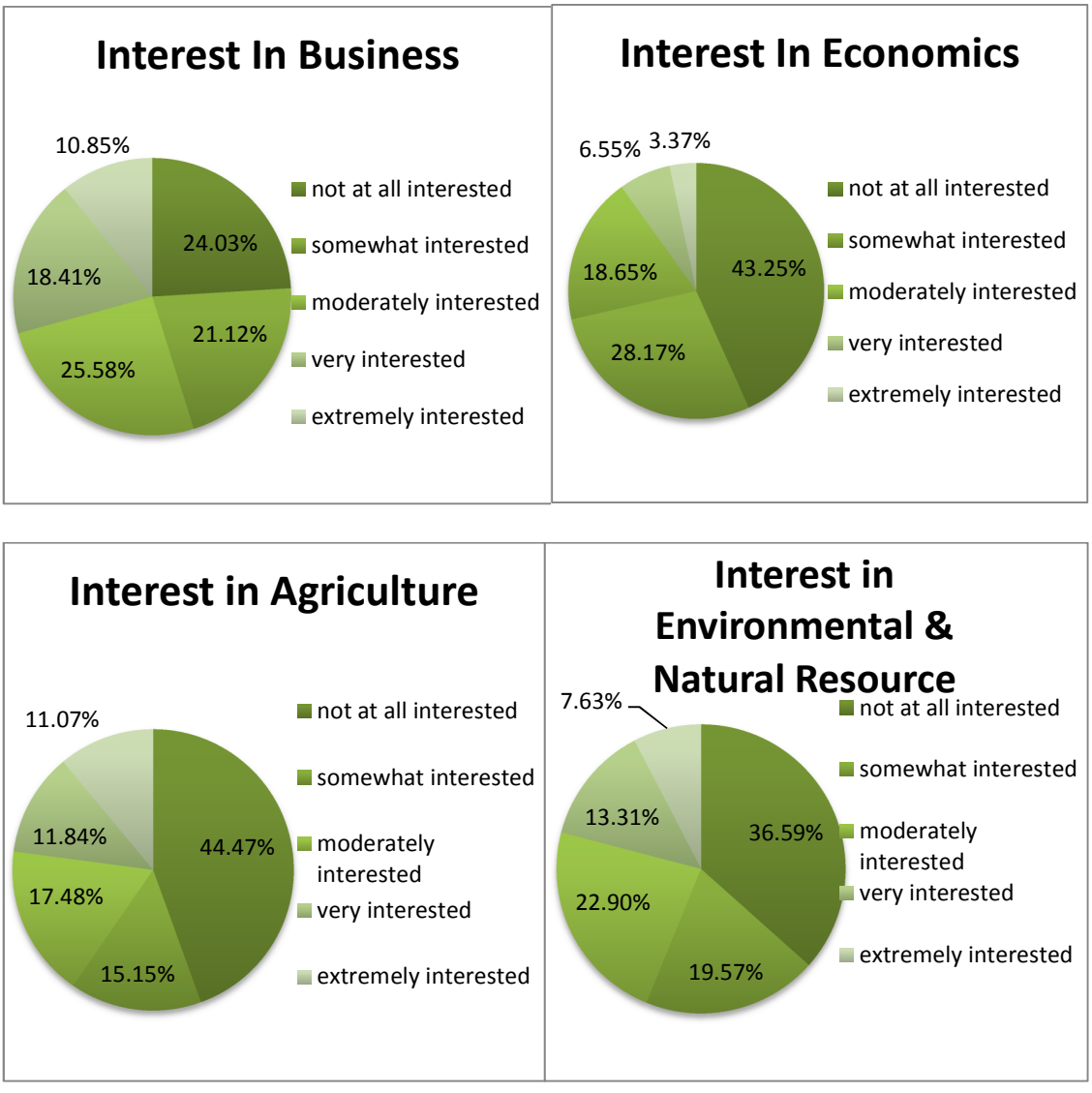
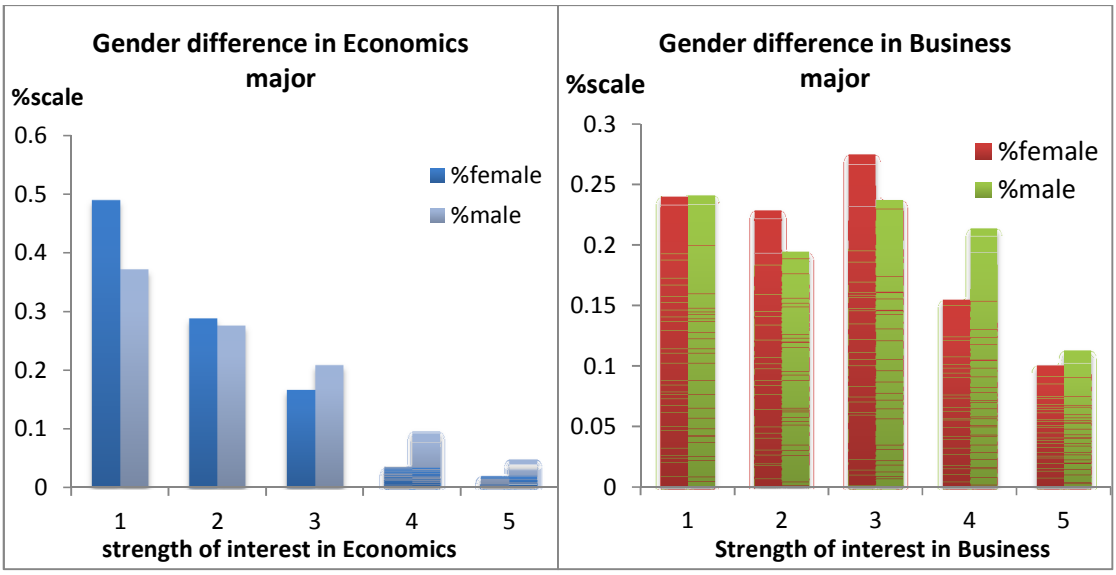


Figure 2


Gender difference in Economics major
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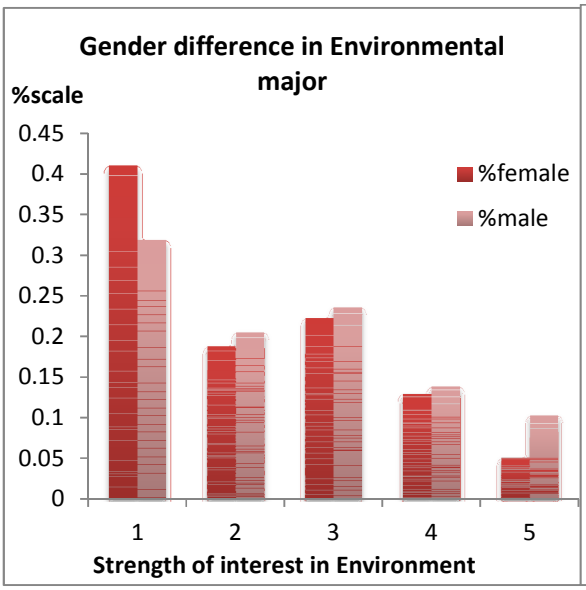
0.4
0.3
0.2
0.1
0
%female
%male
1
2
3
4
5
strength of interest in Economics

Gender difference in Business major
%scale
0.3
0.25
0.2
0.15
0.1
0.05
0
%female
%male
1
2
3
4
5
Strength of interest in Business


Gender difference in Environmental major
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0.3
0.25
0.2
0.15
0.1
0.05
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%female
%male
1
2
3
4
5
Strength of interest in Environment

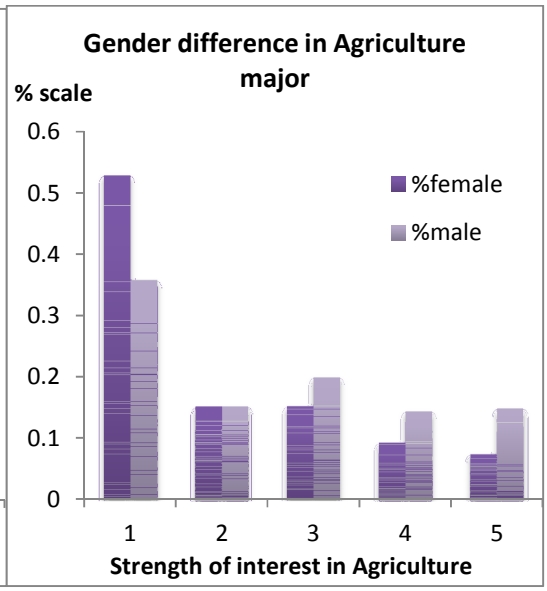

Gender difference in Agriculture major
% scale
0.6
0.5
0.4
0.3
0.2
0.1
0
%female
%male
1
2
3
4
5
Strength of interest in Agriculture

Figure 3

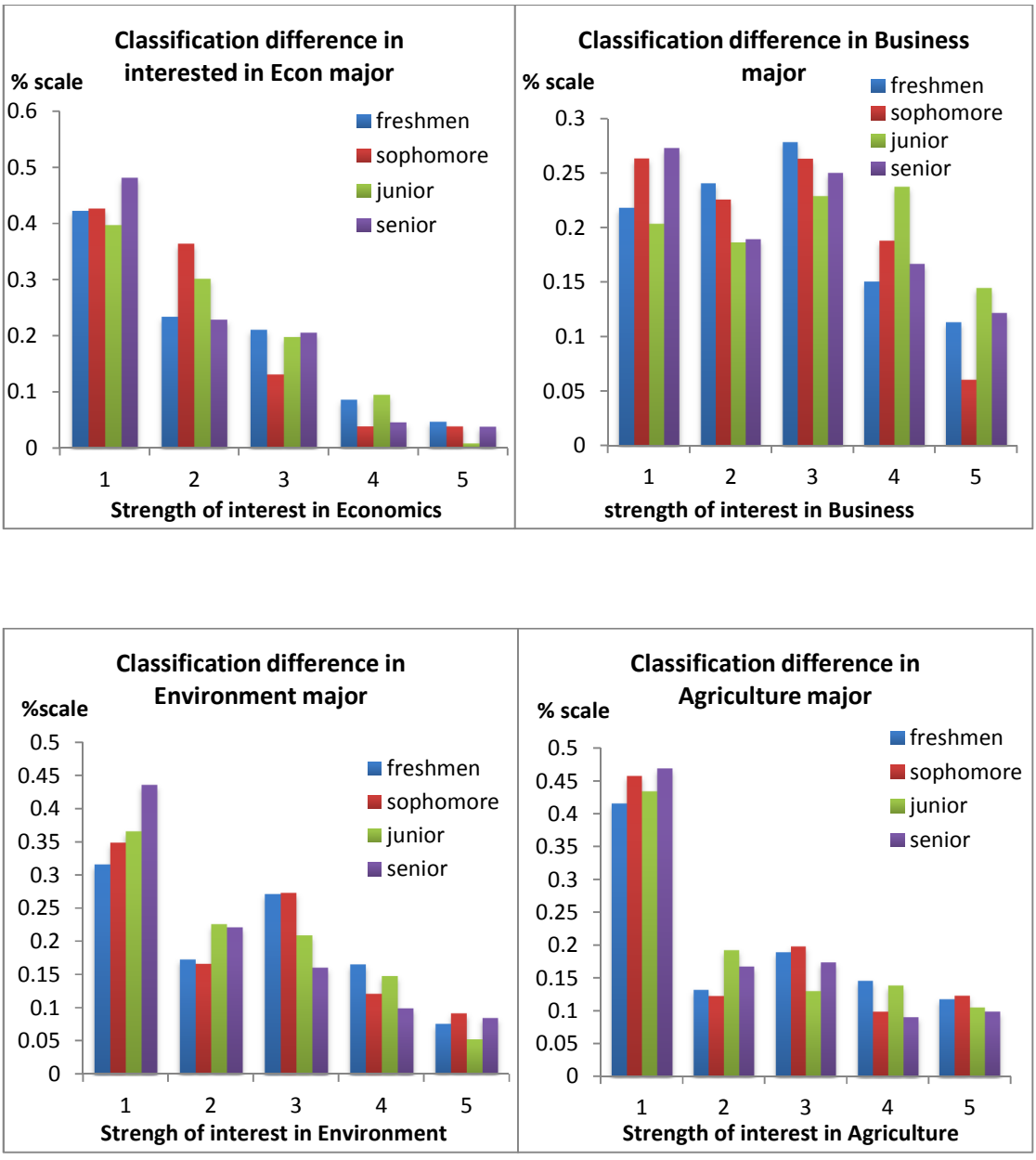

Classification difference in interested in Econ major
% scale
0.6
0.5
0.4
0.3
0.2
0.1
0
freshmen
sophomore
junior
senior
1
2
3
4
5
Strength of interest in Economics
Classification difference in Business major
% scale
0.3
0.25
0.2
0.15
0.1
0.05
0
freshmen
sophomore
junior
senior
1
2
3
4
5
strength of interest in Business
Classification difference in Environment major
%scale
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
freshmen
sophomore
junior
senior
1
2
3
4
5
Strengh of interest in Environment
Classification difference in Agriculture major
% scale
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
freshmen
sophomore
junior
senior
1
2
3
4
5
Strength of interest in Agriculture

Figure 4

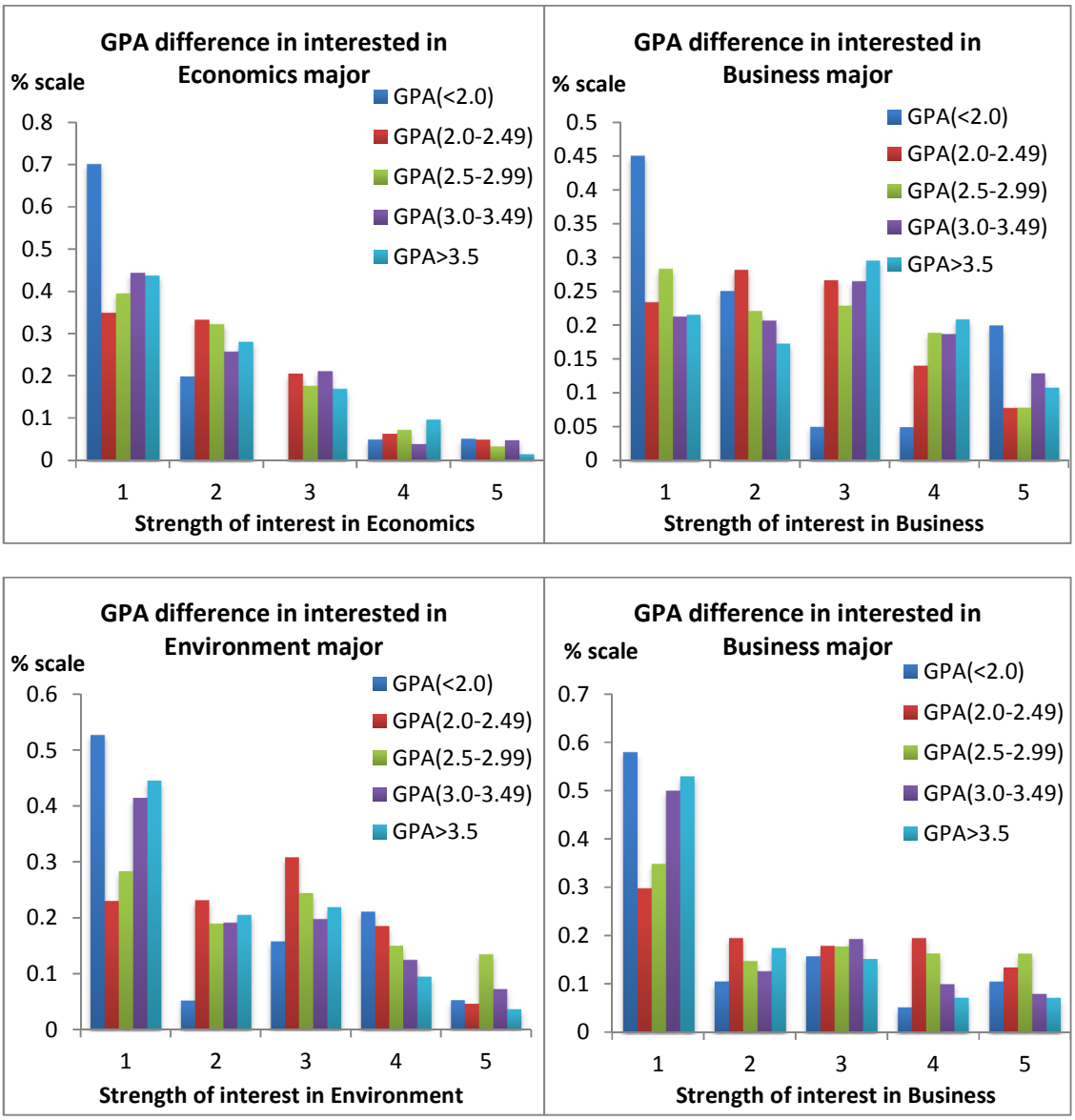

GPA difference in interested in Economics major
% scale
GPA(<2.0)
GPA(2.0-2.49)
GPA(2.5-2.99)
GPA(3.0-3.49)
GPA>3.5
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
2
3
4
5
Strength of interest in Economics
GPA difference in interested in Business major
% scale
GPA(<2.0)
GPA(2.0-2.49)
GPA(2.5-2.99)
GPA(3.0-3.49)
GPA>3.5
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1
2
3
4
5
Strength of interest in Business
GPA difference in interested in Environment major
% scale
GPA(<2.0)
GPA(2.0-2.49)
GPA(2.5-2.99)
GPA(3.0-3.49)
GPA>3.5
0.6
0.5
0.4
0.3
0.2
0.1
0
1
2
3
4
5
Strength of interest in Environment
GPA difference in interested in Business major
% scale
GPA(<2.0)
GPA(2.0-2.49)
GPA(2.5-2.99)
GPA(3.0-3.49)
GPA>3.5
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
2
3
4
5
Strength of interest in Business

Figure: 5 Interest in Economics

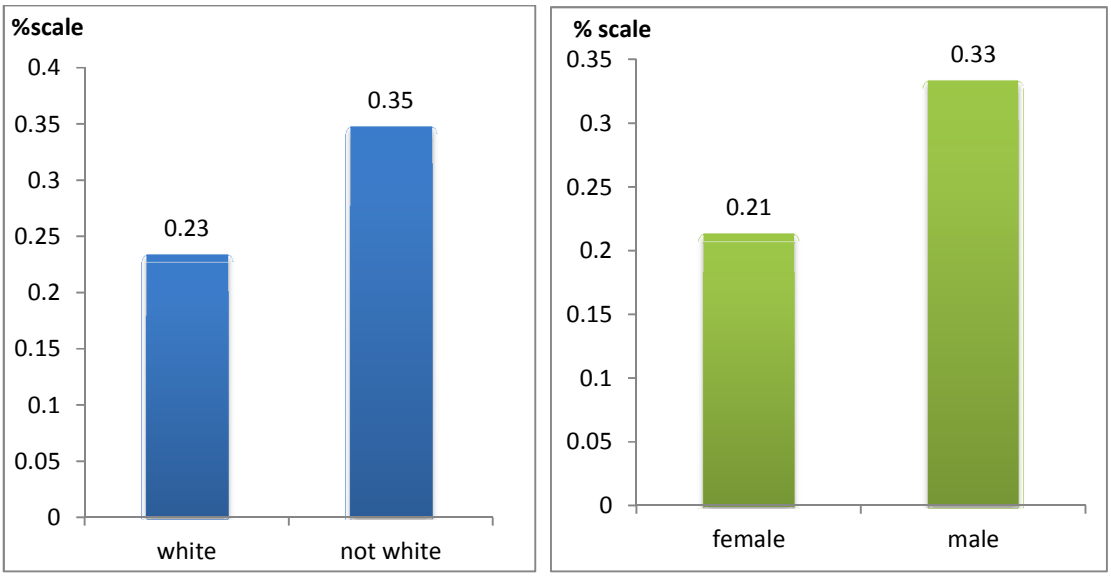


Figure 6

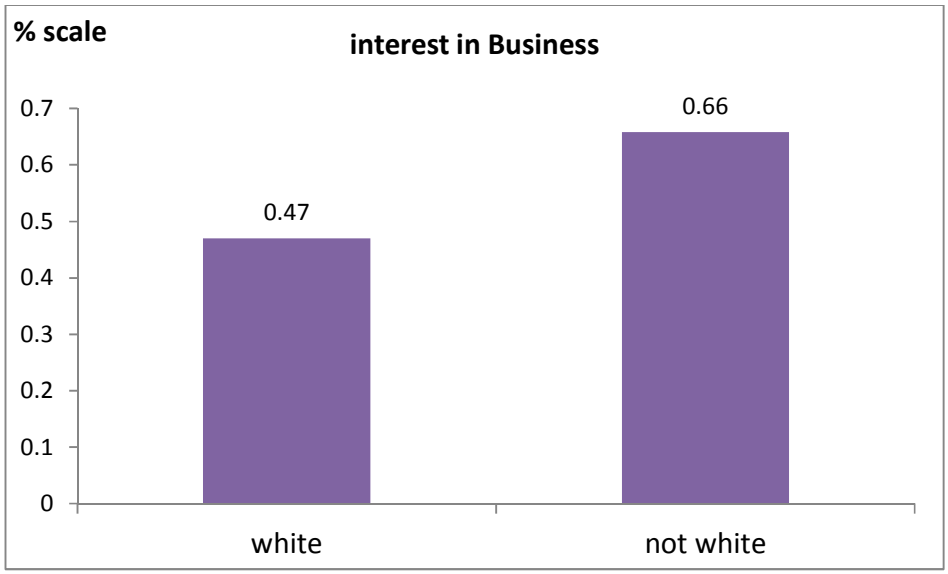


Figure 7

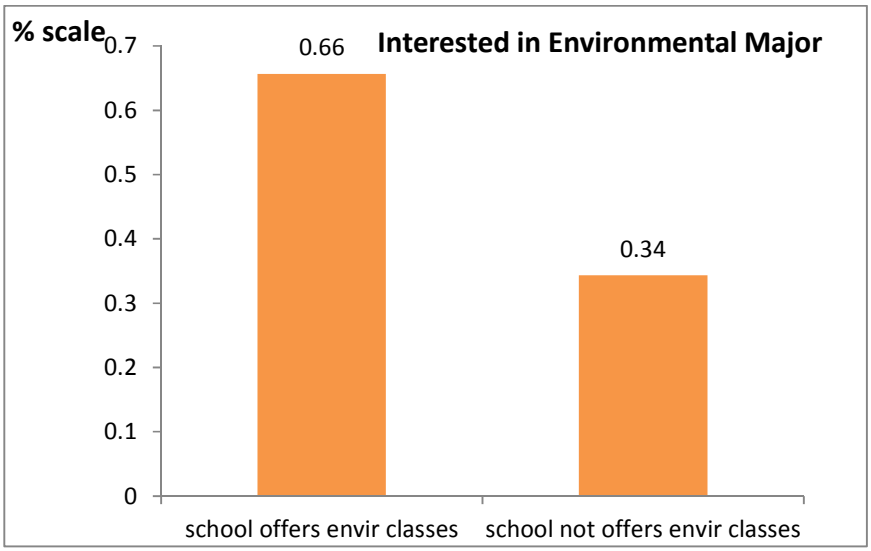


Figure 8

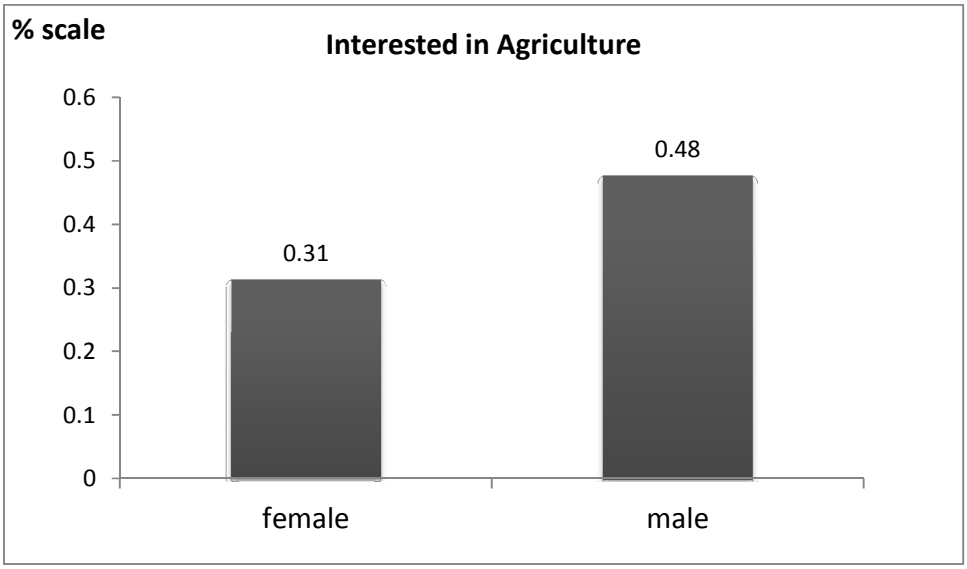


Figure 9

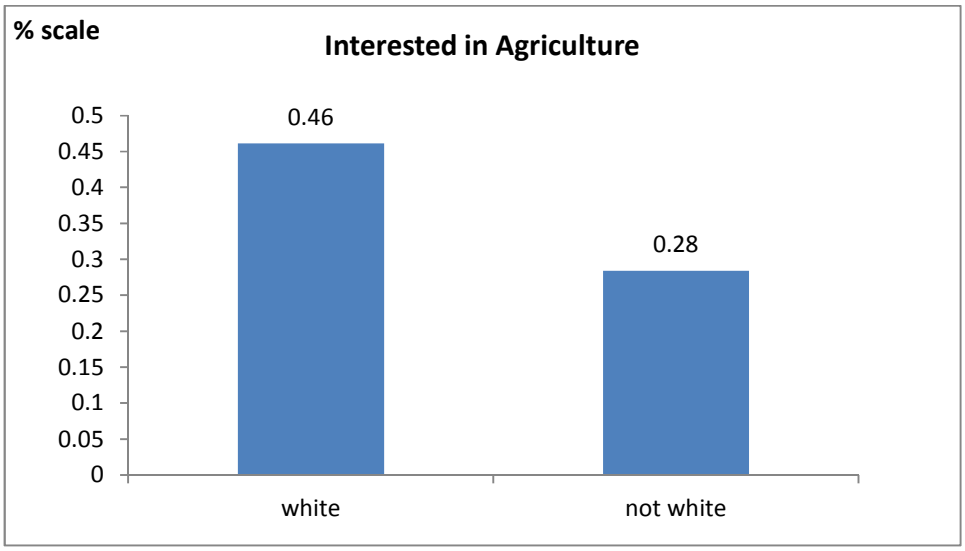


Figure 10

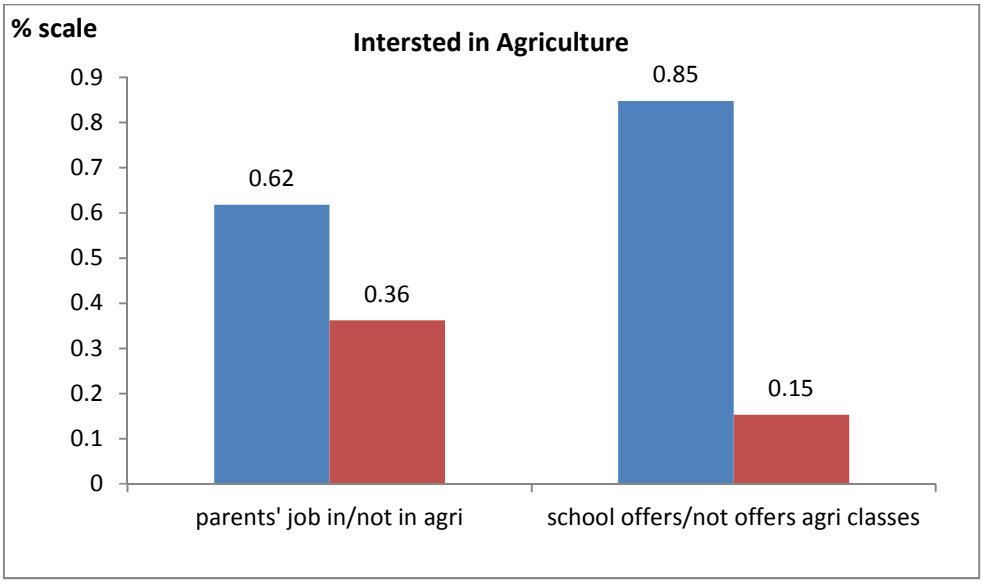


Figure 11

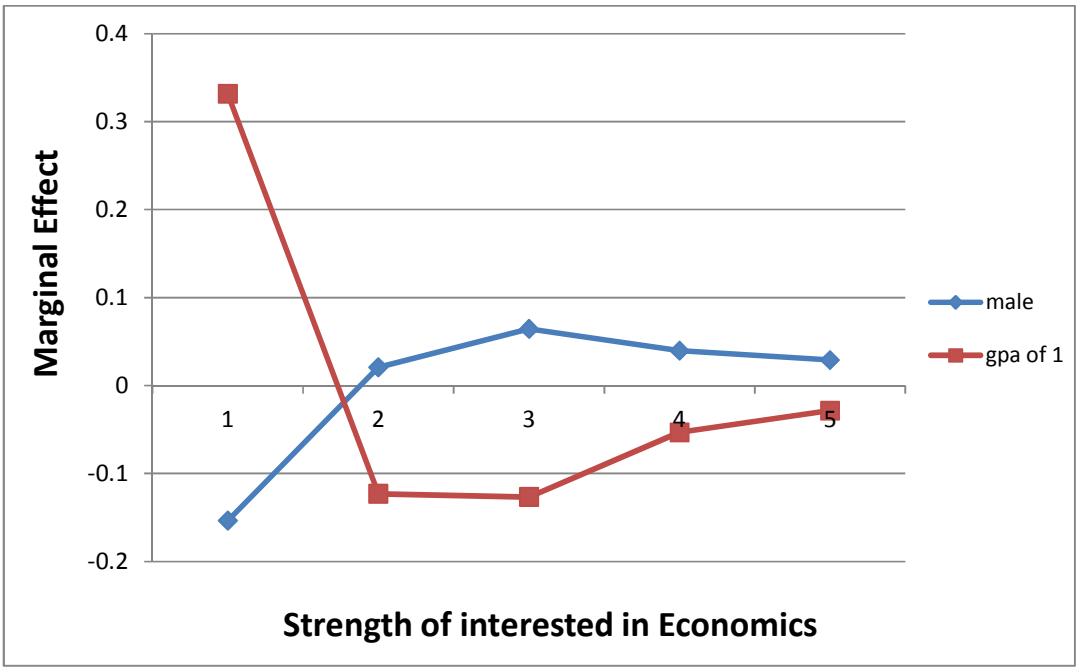


Figure 12

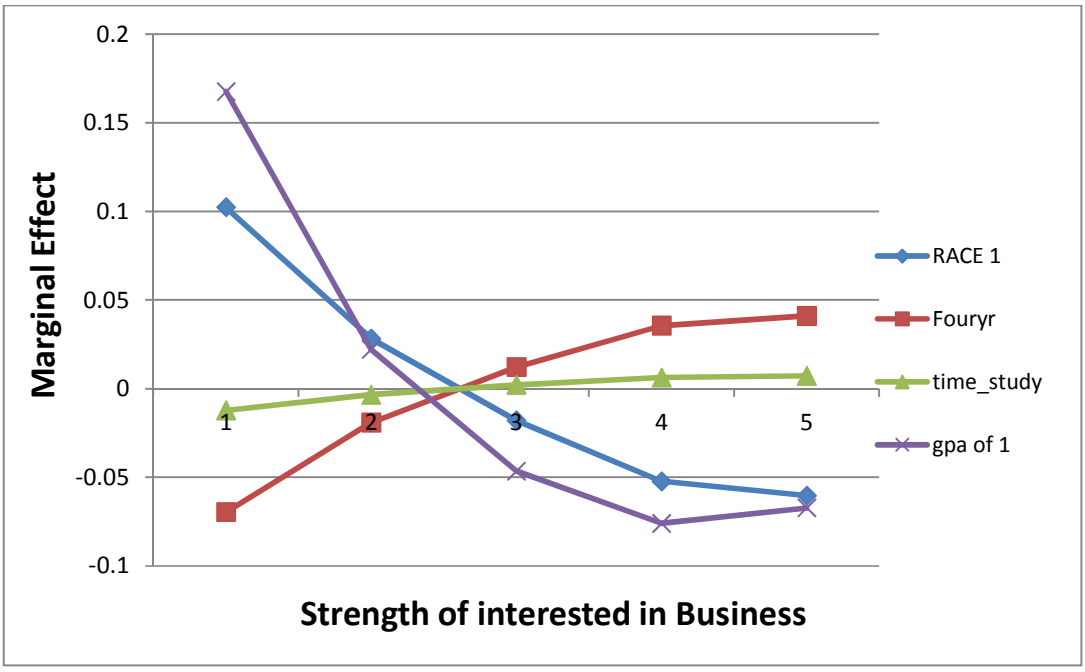


Figure 13

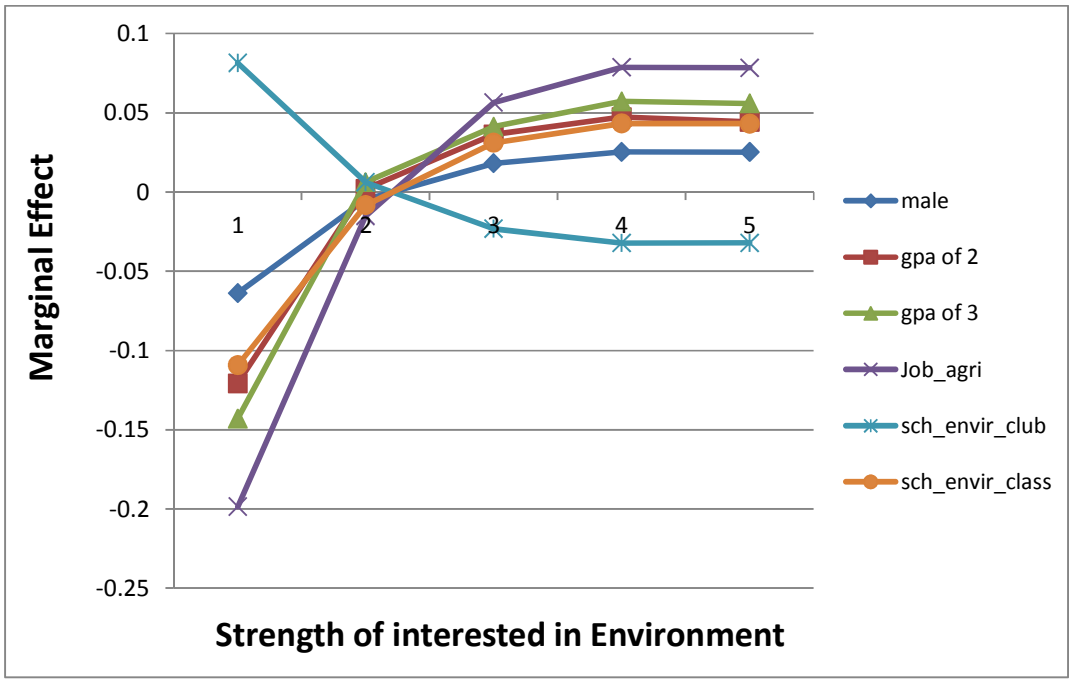
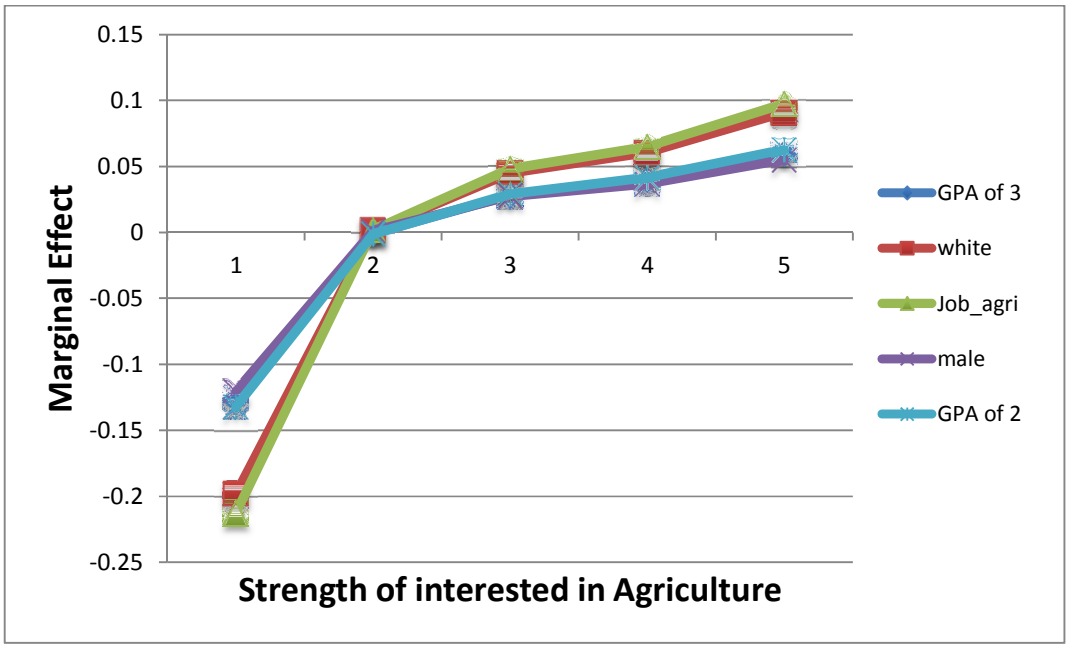


Figure 14



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